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WELCOME A COMMITTEE ON INQUIRY.

In the discussion on the water tube boilers in the house of commons Mr. Goschen, in announcing that he consented to a committee of inquiry being appointed, said:

I wish to give the committee every means of satisfying themselves as to the efficiency of the boilers and the class of defects which occur, and the means applied to remedy them, and what I believe would best meet the case would be a committee on which practical and sea-going engineers —outside engineers—should be largely represented. It should be part of their functions actually to go to sea in some water tube boiler ships and examine the question practically on board ship both on trial runs and under service conditions. The committee should also visit some ships in reserve in dock yards, and study both the scientific or theoretical as well as the practical side of the question. The Europa is one of the ships which I would place at the disposal of the committee for investigation. I should be prepared that they should investigate the whole system of this ship, and tell us what is wrong. They can see the Hyacinth. They can see the Sharpshooter, the Sentry and the Seagull—three ships which we propose to use for extra naval purposes, and for the training of stokers. They can also see the two ships in commission with the Channel squadron—the Diadem and the Pelorus. I think that honorable members will admit that, if the committee undertook duties of this kind, it would be a means by which the house and the country might assure itself as to the efficiency of these boilers, and as to the remediable or irremediable character of the defects. The committee would, of course, have the opportunity of calling witnesses. I have no doubt that the proposal will commend itself to all who desire a practical examination of this most complicated question.

EXPENSES OF THE NAVY.

The auditor of the navy department has submitted to the secretary of the treasury his annual report of expenses of the navy for the fiscal year ending June 30, 1900. The total amount expended is shown to have been $61,971,000. The continued enlargement of the navy and marine corps and their activity in foreign waters caused the volume of expense to be greater than ever before for the maintenance of the navy. Only $32,576 for prize claims in the Spanish-American war was paid, the great bulk of these claims awaiting action of the courts.

In concluding, the auditor says that on June 30 last the unusually large sum of $19,082,224 was carried to the surplus fund from unexpended naval appropriations. Of the $50,000,000 appropriated for an emergency fund $17,000,000 was returned to the treasury. Of the $2,647,900 appropriated for vessels of the United States auxiliary naval force $2,250,000 has been returned, and of $275,000 for naval coast signal system $250,000 has been returned. The appropriations for pay of the navy for 1898 and 1899, which was $17,955,460, had $5,033,381 to its credit on the books on June 30, 1900, of which no considerable part will hereafter be required to pay outstanding claims. Of the sum appropriated to pay off the navy in 1900 more than one-third remained undrawn at the end of the fiscal year, and for the pay of the marine corps more than one-fourth was undrawn. The probability is that no deficiency will arise under these two appropriations. The amount expended for the increase of the navy in 1900 was $14,398,243, leaving a balance unexpended of this fund on June 30 last of $9,749,122. The appropriation for the purpose for 1901 was $17,315,699, making a total available at present of $27,064,821.

LAUNCH OF PRINCETON WAS QUITE IMPORTANT.

The launching of the steamer Princeton at Lorain on Saturday completes the list of steamers building for the Pittsburg Steamship Co. (Carnegie fleet) in the yards of the American Ship Building Co. The Harvard was launched at Detroit recently, the Lafayette at Lorain, the Cornell at Chicago and the Rensselaer at Cleveland. The steamships are all 474 ft. long over all, 454 ft. on the water line, 50 ft. beam and 28½ ft. deep. The launching of the Princeton was made an event of much importane. The vessel was christened by Miss Katherine Reid of Pittsburg and the Japanese custom of releasing doves was observed. A delegation of seventeen ladies and gentlemen arrived from Pittsburg to attend the ceremony. Moreover the event was made the culminating one in a tour of the lakes by the officials of the Carnegie Steel Co. A party consisting of President Schwab, James Sayley, George Lauder and D. M. Clemson of the Carnegie Steel Co., Judge James H. Reid, president of the P., B. & L. E. R. R., and President Thomas Lynch of the H. C. Frick Coke Co., who had been inspecting Carnegie interests on the lakes, were present. This party had previously made a thorough tour of inspection, having inspected the Carnegie docks at Conneaut and visited the mines of the Oliver Iron Mining Co. on the Vermillion and Mesaba ranges. They were eminently satisfied with all that they saw during their tour of inspection.

NAVIGATION AT AMHERSTBURG.

Capt. McKay visited Amherstburg a few days ago to determine upon the location of lighted buoys to aid navigation while the dredges are working in the channel. The dredges are now working in a direct line with the Elliott point range light. Four lighted buoys have been placed on the westerly side of the channel and indicate the extreme westerly point at which navigation is safe. Indeed it is safest right in the line of the four buoys. The channel therefore lies between the Elliott point range light and the four temporary buoys and vessels should pass as close to the buoys as possible.

It is said that the Eastern Ship Building Co., New London, Conn., will submit bids for the construction of the battleships and cruisers soon to be placed under contract for the United States navy. The keels for the big Hill steamships for the Pacific trade will be laid within eight weeks.

ELECTRIC LAUNCH CO.'S NEW PLANT.

The new building of the Electric Launch Co. of Morris Heights, which is situated near the edge of Newark Bay, is rapidly nearing completion. Its roof is now being slated and floors are being put in on the second story. Boilers, engines and dynamos have been fitted up in the engine house. All that is now needed in that building is steam piping, the shipment of which has been delayed.

When completed the building of the Launch company will possess all the latest conveniences, and will be able to turn out graceful craft much faster than at present. In the main building will be an immense hoisting frame for moving boats from floor to floor. There will be a similar frame on the outside of the building for loading boats on railroad cars and another on the pier for lowering boats into the water. There is also a runway on the pier, so that launches may be run from the manufactory into their natural element.

The launch company shipped away two large boats last week to Lake Placid, in the Adirondacks. One, 36 feet in length, was consigned to C. W. McCutchen of the firm of Hall & Co. The other, 18 feet in length, finished in mahogany and nickelplate, went to A. G. Mills, vice-president of the Otis Elevator Co. A number of handsome launches are in course of construction. Walter Luttgen, partner of August Belmont and member of the Columbia Yacht Club, has ordered a 36-foot boat. It will have a cabin, furnished with upholstered seats, a cook's galley and lavatories. When finished the boat will be sent to the Columbia Club's boat house at West Eighty-sixth street, New York city. Another 36-foot launch has just been sold to R. Dickinson Jewett, at Nyack, N. Y.

RUSHED WITH WORK.

The W. R. Trigg Co., Richmond, Va., will put a large number of additional employes to work in a few weeks owing to the press of work on government cutters and the new cruisers. The force in the hull department will be increased by 100, making 337 in that department. There will be corresponding increases made in all the departments. The ways for receiving the Plunger, the submarine torpedo boat being repaired at the yards, are nearly completed, and the boat will be brought out of the water early next week. Six months will probably be required for the completion of the work on her.

The torpedo boat Stockton will make her trial trip in about two weeks. Her dock trial began this week and will last several days. At its conclusion she will steam down the James to have her builders' trial, probably on Chesapeake bay, as Vice-President Myers has written the secretary of the navy, asking him to designate the trial course and expressing preference for the Chesapeake for the standardizing screw test. Then the little ship will go to sea to try to make the 26 knots an hour that the government will require before accepting her as a part of the United States navy. Th Stockton is the first of the torpedo boats of the last twelve authorized by congress to go into the water for her trial trip. The officials who have carefully inspected the boat expect the trial trip to be a source of gratification to the Trigg company.

PIG IRON PRODUCTION, FIRST HALF OF 1900.

The American Iron & Steel Association has received from the manufacturers and publishes in the Bulletin of Aug. 1 complete statistics of the production of all kinds of pig iron in the United States in the first half of 1900; also complete statistics of the stocks of pig iron which were on hand and for sale on June 30, 1900. The figures show that the total production of pig iron in the first half of 1900 was 7,642,569 gross tons, against 6,289.167 tons in the first half of 1899 and 7,331,536 tons in the second half. The increased production in the first half of 1900 over the second half of 1899 was 311,033 tons. The production in the second half of 1899 and the first half of 1900 aggregated 14,974,105 tons, or almost 15,000,000 tons. The enormous production of the first half of 1900 will not be continued in the second half, as demand has slackened. A check in production began in June, when some furnaces were banked and others were blown out.

NEW FRENCH LINER DOES 22 KNOTS.

Agent Bocande of the French Line received a dispatch from his home office this week that the line's big new twin-screw steamship La Lorraine had arrived at Havre after a successful sea trial trip. She averaged 22 knots, thus proving herself the fastest French merchantman afloat. If she maintains this average on a voyage she will be about equal to the Lucania and Campania of the Cunard line. She measures 12,000 tons and has engines of the triple-expansion type with four cylinders, which were built to develop about 22,000 horse power. She is 580 ft. 8 in. long, of 60 ft. 2½ in. beam and 39 ft. 4 in. deep. She will sail from Havre for New York on Aug. 11.

Chief Constructor Hichborn of the United States navy is at work on his annual report, which may be the last document of that character to be signed by Rear Admiral Hichborn, who reaches the age of retirement in March next. Efforts are being made to have the chief constructor remain in the service, under the provisions of the law authorizing the detail of retired officers to active duty in the navy. The forthcoming report will embrace a history of the chief constructor's career in the service, and contain a faithful record of the various important questions which have engaged the attention of his bureau.

The navy yard authorities in Brooklyn have been notified that the cruiser New York and the battleship Texas will soon be detached from the North Atlantic squadron and sent to the yard for extensive repairs. This will result in the employment of most of the men who were recently laid off in the department of construction.

TORPEDO BOATS FOR THE DUTCH NAVY.

Messrs. Yarrow & Co. have just completed two first-class torpedo boats for the Dutch government. The vessels are named Hydra and Scylla, and are intended to strengthen the naval power of the Dutch authorities at their East Indian colonies. They are 130 ft. long and 13 ft. 6 in. beam, and have a displacement of about 90 tons. Their guaranteed speed on official trial, carrying a load of 16½ tons, for three hours, was 23 knots. The general arrangement of these boats is similar to what is customary in vessels of this class, the crew space being forward and the officers and petty officers having their cabins aft. The machinery consists of a set of inverted triple-expansion surface-condensing engines, indicating about 1,200 H.P. The air and feed pumps are driven off the forward end of the crankshaft. The special feature about these engines, in which they differ from those of other torpedo boats, is the system of forced lubrication which has been adopted, the working parts of the engines being completely enclosed. This plan has been introduced with great success in many types of land engines. The great advantage of forced lubrication is that all anxiety on the part of the engineering staff is set at rest as regards this point, which is one of the most important in the proper working of such fast running machinery. As a consequence a smaller engine room staff may, in case of emergency, control the machinery; as the lubrication, being self-acting, does not require attention. This might be a circumstance of the very first importance in time of war, when engineers and artificers may be very scarce indeed. There is a centrifugal circulating pump with its engines for supplying the condenser with water; an evaporator and distilling plant, in duplicate; steam steering engine and air compressor; also dynamo for electric lighting. There is an overhead fan and fan engine in the stokehold between the two boilers for forced draft.

The boilers are of the Yarrow water tube type, with, of course, straight tubes. There is a Worthington pumping engine in the stokehold for feeding the boilers when the main engines are not working. The bunkers hold about 18 tons of coal. The armament consists of three 18-in. swivel torpedo tubes, and two 6-pounder quick-firing guns.

The official trial of the Hydra took place on May 25, under the direction of Mr. Loder, chief constructor of the Royal Dutch navy; Mr. Koning, Engineer-in-Chief and Capt. de Booy, who will command the vessel. A mean speed of 24.37 knots was made for the three hours, with 160 lbs. of steam, and a trifle over 400 revolutions per minute, the load carried being 17½ tons. The official trial of the Scylla took place on June 26, with practically the same results. This trial was directed by Mr. Loder and Mr. Koning, who again represented the Dutch authorities, assisted by Capt. Smit, who will command this vessel.

Both these vessels have since had a full-speed trial to show their capabilities when burning astatki, by means of Holden's spraying apparatus, with which the vessels are fitted. It has been shown by these trials that there is no difficulty in burning this oil, and as it is plentiful in the Dutch East Indies there is no doubt it will be found an important adjunct to coal. It is proposed to burn the two in combination, as usual on the Great Eastern railway..

The Hydra and the Scylla will be immediately fitted with their equipment in Holland, and it is expected during next month they will start for their station in the east via the Red Sea. It may be here stated that Messrs. Yarrow & Co. have in the course of construction three somewhat larger first-class torpedo boats for the Dutch government for home service in addition to a number of similar vessels for the Japanese authorities.

ABANDONMENT OF COLLIER BRUTUS.

Capt. Richard P. Leary, U. S. N., governor of Guam, in a report made public by the navy department on July 25, gives an account of the abandonment of the United States collier Brutus off Guam two months ago and her subsequent recovery before she had suffered serious injury. A court of inquiry was appointed by Gov. Leary to investigate the circumstances of the abandonment. The court exonerated the officers and crew of the vessel and commends their conduct. The Brutus has been the station ship at Guam. She was and is still commanded by Lieut. A. B. Hoff, U. S. N. At the time of the trouble which she experienced the Brutus was riding at single anchor off San Louis d'Apra. A storm came up in the night, and starting fires, Lieut. Hoff kept the vessel steaming ahead to ease the anchor cables. At daylight it was found necessary to change position, owing to the proximity of a dangerous reef, but in getting under way an anchor failed to come up quickly and the steering gear got out of order. This brought the Brutus around broadside to the reef. She grounded heavily, seas passed over to the starboard side, and there was danger that she would capsize. Lieut. Hoff decided to abandon the vessel while the tide was low, it being impossible to do so at high tide. A landing was made on the reef and a boat was dragged along it to Cabris island, whence communication with shore was secured. The next day the hospital ship Solace came to the assistance of the Brutus and succeeded in getting her off the reef. Officers and men had been constantly on duty three days when the ship was abandoned.

Dry dock No. 2 at the Brooklyn navy yard, which is being repaired at an expenditure of $1,000,000, sprung a leak on Tuesday last and in a few hours there was 10 ft. of water in the drydock. The leak was caused by the removal of the caisson from the mouth of drydock No. 3. If the water continues to run into the uncompleted dock the repair work of six months will need to be done over. The damage is already large.

Rule 3 of the rules and regulations for Portage lake ship canals, Mich., has been altered by the secretary of war, upon the recommendation of Maj. Clinton Sears, government engineer, to permit vessels hereafter to go at full speed through the Portage river and the cuts, therein. The rate of speed through the upper canal, however, is to remain at not to exceed five miles per hour.

Mr. Fred H. Pell of No. 11 Broadway, New York, who is well known to ship builders throughout the country, has been appointed agent for New York and the New England states by the Standard Chain Co.

ACCIDENT TO THE TORPEDO BOAT DUPONT.

If one were in search of ocular evidence of the fine quality of steel which is used in the construction of torpedo boats he could not do better than study the crumpled up bow of the torpedo boat Dupont. The plating was folded back on itself, concertina-fashion, so that the whole of the forward compartment, which was about 8 ft. in length, has been compressed within a space of not more than 2 or 3 ft. This was an extemporized "cold-bending test" that speaks well for the quality of the material. Not only does the mild, open hearth, steel, of which the thin ⅛-in. plates are composed, fail to show a single crack in any of the folds or laminations, but the riveted joints of the plating in many cases are not even started.

Although to the lay mind the fact that the plating of the Dupont should submit to such rough usage without a sign of fracture is very astonishing, it is well understood by builders of torpedo boats and other naval craft that this test is not nearly as severe as that which the plates have to undergo before they are accepted and built into the vessels. Thus, for instance, in the cold-bending test, two pieces cut from each heat during the manufacture of the steel must be capable of being bent over flat upon themselves, without showing any sign of fracture on the outside of the bend; while in the quenching test the specimens are heated to a dark cherry-red, plunged into water at 80 degrees Fahrenheit, and then must submit to be bent over a piece of their own diameter without fracture. This, it will readily be seen, is far more severe than the treatment to which the plates were subjected in the collision.

The accident to the Dupont happened at Newport when the craft was being brought into her berth. Ordinarily in bringing these little craft to their moorings, they are run into the dock at a speed of from 10 to 12 knots, and when a given point on the vessel passes the end of the dock the bell is rung for full speed astern. Such is the power of the engines that the craft is brought to rest as soon as the stern has passed within the pier head. On this particular occasion the signal was given about a second too late, with the result that the Dupont struck the end of the dock when she was yet traveling about 4 knots an hour. As it happened, the bow served as an excellent buffer, bringing the vessel gradually to a rest without dislocating the steam pipes, boilers or engine fittings.—Scientific American.

NEW LIGHT-HOUSE IN PELEE PASSAGE.

Capt. McKay, on his late trip to Amherstburg, met Col. Anderson, chief engineer of the Canadian department of marine, who was surveying the middle ground of Pelee passage, to select a site for the new light-house, which the Canadian government is preparing to build there to replace the dummy light. An appropriation was voted by the Canadian parliament just before its adjournment this month, for a first-rate light and fog alarm in the middle ground, and Col. Anderson is pushing the work vigorously. The pier will be located in 14 ft. of water as near the north extremity of the shoal as a suitable bottom can be found. It will be of stone, in a steel caisson, and will be protected against ice and waves by a heavy crib work breakwater. The tower will be fireproof and will be surmounted by a modern quick flashing light, and a first-class fog siren will also be provided.

Col. Anderson proposes to build the pier at Amherstburg, and has left Mr. W. H. Noble there in charge of construction. He hopes to be ready to put the pier in position on September next, but the light-house will probably not be completed until next year. As soon as the pier is in place a temporary light will be shown from it; the middle ground buoy will be removed to southeast shoal, and the southwest shoal buoy utilized to mark south reef. Col. Anderson drew Capt. McKay's attention to the fact that vessels give both Colchester reef and the middle ground a wider berth than is desirable. A better course could be shaped by passing quite close to the gas buoy, which is in 32 ft. of water.

TRANSPORTATION TO ASIA.

Mr. E. T. Chamberlain, commissioner of navigation, in an article on transportation to Asia in the North American Review, says: "The commercial importance of the new conditions of ocean transportation to Eastern Asia seems to have been more fully and more quickly realized by foreign countries than by the United States, which in all its interests ought to be the greatest beneficiary in the new order of things. While we are, many of us, chopping over academic theories and discarded or inopportune policies, other nations are contriving to make the best for themselves out of the situation. . . . A legislative proposition which has for one of its principal objects the establishment, as soon as practicable, of the best and greatest facilities for the transportation between the United States and Asia is entitled to the careful consideration of every American. It is of as much importance to the cotton states of the south and the wheat and corn belt of the northwest as it is to our seaboard constituencies."

The Harlan & Hollingsworth Co.'s ship yard at Wilmington, Del., is a busy place at present. The steamship Whitney, which was launched several months ago for the Metropolitan Steamship Co., is nearing completion and will probably be given a trial trip some time next month. The steamship Indian, which was recently cut in twain and lengthened, is also nearly finished and will be ready to leave in several weeks. The work on the two torpedo boats, Hull and Hopkins, is going rapidly forward and they will be launched early in the fall. In addition to the above work the company has a large amount of repair work on hand. The car shops are also busy and shipments of cars are being made every week.

The steamboat City of Salem, built for parties in Salem, N. J., was launched from the yards of the Jackson & Sharp Co., Wilmington, Del., last week. The vessel is 108 ft. long, 28½ ft. wide and 7 ft. deep, and will be placed on the route between Salem and Philadelphia.

Mr. Henry Konitzky, 1911 Diamond street, Philadelphia, has just returned from Europe where he spent several months in the principal ship yards with a view to acquainting himself with anything new that may be going on in ship building lines. He is now open for employment. He has had twenty-five years experience as a constructor of ships.

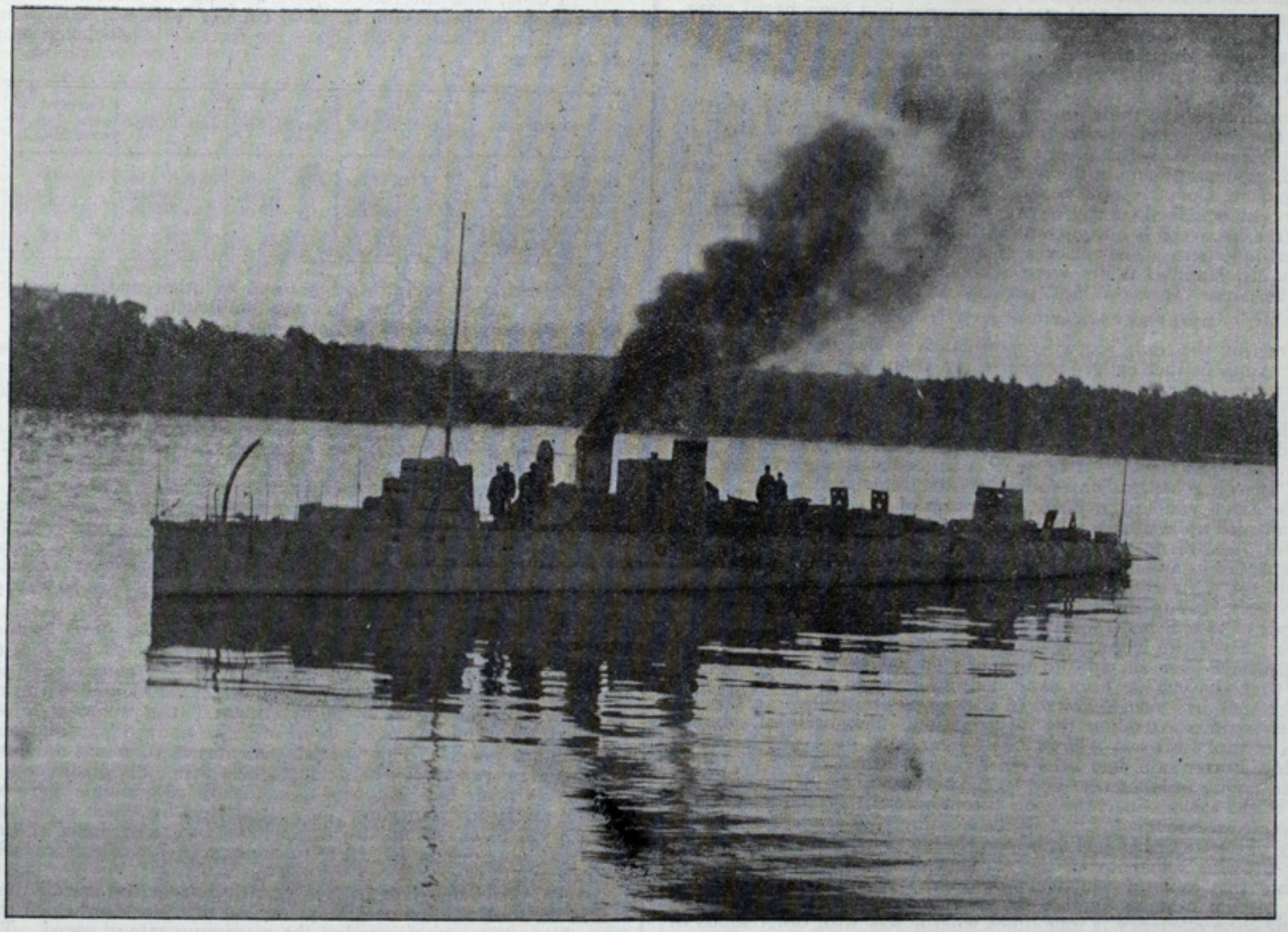
GENERAL METHOD OF BUILDING A VESSEL.

THE FOLLOWING DESCRIPTION OF THE GENERAL METHOD OF BUILDING A VESSEL IS REPRINTED FROM THE SOUVENIR EDITION OF THE HISTORY OF THE BATH IRON WORKS, BATH, ME.

When the contract for the construction of a vessel is signed, and as soon as the dimensions and the general arrangement plans and specifications are approved by the owners, work commences immediately in the draughting rooms. The lines and shape of the hull to fulfill the requirements regarding speed, dead weight capacity, etc., are first determined upon. These lines are then faired up on a large scale, and the offsets furnished to the mold loft, where the work of laying down the vessel full size commenced immediately. In the meantime a wood model on ¼, ⅜ or ½" scale, according to the size of the vessel, has been made by the pattern maker from the original office lines, and on this model is lined off all the plate edges, butt, laps, etc., of the shell plating. If the vessel has a double bottom following the outer bottom and sides, such as is usually fitted on war vessels, a model of the inner bottom is similarly made and lined. The keel, bulkheads, decks, foundations, bow and stern framings, deck-house, casings and similar plans are roughly outlined. The floor-heads, keelsons and stringers are marked on a frame body plan taken from the large scale line drawings, and within a few days of the signing of a contract all the steel plates and shapes are ordered. The stem, stern post rudder and other large forgings or castings, rivets, deck plank and wood for all other carpenter and joiner work is then ordered, and the drawings are gradually finished, traced and approved, and sent into the yard and shops ready for work when the material arrives. If the vessel is a steamship, the engineering department is notified as soon as the contract is signed what power is required for the vessel, the general type of machinery and the space available for the same, and they at once proceed to determine the size of engines and boilers, and prepare general arrangement plans. The boiler steel is soon ordered, the engine forgings follow, and in a few weeks the pattern for the cylinders, bed plates, etc., will be seen in the foundry.

The keel blocks on one of the sets of ships ways are located to suit the keel of the vessel to be built and when the hull steel arrives all is ready to hurry the work along. The frames and reverse frames are bent on the slab as per wooden molds furnished by the loft; the floor plates are laid out from the same frame molds and the vertical keel, bulkheads, longitudinals and intercostals, if the vessel has any, are all laid off from molds, punched and sheered ready to be fitted in place on the ship. Each frame, with its floor and reverse frames, are riveted by pneumatic tools before being erected, and all the riveting, etc., possible is done before the members are placed in position on the ways. The keel plates, bulkheads, deck beams, etc., are all laid off, shaped and punched in the shop, so that when the keel is laid on the blocks the framing of the ship is soon erected and faired in position. If the stern forgings or castings arrive at the works in time the vessel is framed from aft forward, if not the midship frames are erected first and the vessel is framed from amidships to the ends. As soon as the framing of the ship is faired and rigidly connected the shell and decks are plated, deck house erected, and the different connections are riveted, and when necessary calked for water tightness. When the shell is completed, the stern tube, if the vessel is a steamer, is bored out and the tail shaft, propeller outboard valves, etc., are fitted in position and the vessel is ready to launch. The staging is now removed and the standing and sliding ways with packing are placed in position. On the morning of the day of the launch the standing ways are well greased, and when all is ready the wedges at a signal are driven in, and the ship is raised sufficiently to release the stress upon the blocks. These are then split from end to end of the vessel, allowing the whole weight to rest upon the sliding or launching ways which, in turn, lie upon the permanent or ground ways. After the blocks are split and the ship lies on the launching cradle which, by the way, is lashed together under the keel by strong rope toggles from side to side at intervals towards the bow, where the model is leaner and the dividing strain is greater upon the cradle, the shore braces are knocked down one by one, thus removing from about the hull the last semblance of ground support.

At this stage the ship would break away and slide into the water, were she not held to her place by an arrangement of iron rods, pins and rope lashings. This arrangement secures the sliding to the permanent ways, and until it is removed there is no possibility of the ship starting away. When all is ready and nothing is found to remain to prevent the launch itself, the final act is performed by the cutting of the rope lashings, and drawing out of pins before mentioned, and which secured the two sets of ways together. The instant the axes sever the rope lashings there is heard a sharp cracking and rending sound, and the huge mass is seen in motion rapidly augmenting in speed for its final plunge. A steep auxiliary set of ways under the fore foot are often fitted to assist the vessel in starting, but hydraulic jacks, bumpers, etc., are seldom found necessary. The concern builds all its vessels so as to launch stern first. The ways are located approximately square to the river line, and as the Kennebec river is about a mile wide opposite the works, some of the prettiest launchings in the world have been seen at Bath. The vessels are allowed to run out well into the stream and a towboat brings them back to the company's wharf. The time consumed between the signal for wedging and the actual start varies from 7 to 8 minutes for small craft to 15 or 18 minutes for the larger sea-going ships. Soon after the launch the vessel is moved to wharf No. 1 and the large derrick places the boiler and engine on board. Carpenters complete the wood decks and similar work, and soon the vessel becomes a busy working center for shipwrights, carpenters, joiners, pipers, plumbers, machinists, boilermakers, calkers, riggers, painters, etc. At last the work is almost completed, steam is put on the boiler, the engine is turned over, and the vessel is loaded and trimmed for her speed test. The company has had a statute and a nautical mile deep water course surveyed off the Southport shore at the entrance to Boothbay harbor. This course has been measured and approved by the United States government and several war vessels have steamed over this base on their official trial. The Southport mile is about 13½ miles distant from Bath, but the steam vessels usually proceed to the course by way of Popham, this distance being 19 statute miles. After the vessel has successfully passed through the progressive measured mile trial, or sea trial and turning trials, she returns to the yard, where she receives the few necessary finishing touches, and is made ready for delivery to her owners. If the vessel is a barge or sailing vessel no trial trip is necessary; and when the contract for the construction of a steamer requires neither a guarantee of speed or power, the machinery is quite often tested by a few hours' run at sea.



TORPEDO BOAT T. A. M. CRAVEN, BUILT BY THE BATH IRON WORKS, BATH, ME.

SPEEDING MACHINE TOOLS.

WHAT AMERICA'S GREATEST MANUFACTURERS OF STEEL FORGINGS, THE BETHLEHEM COMPANY, HAVE DONE WITH TOOL STEEL MADE BY A NEW PROCESS

(Staff Correspondence.)

South Bethlehem, Pa., July 31—The Bethlehem Steel Co., owning the greatest plant in America for the manufacture of steel forgings, has made a discovery in tool steel that will undoubtedly command the attention of the world. On several occasions during the past two years the trade journals have referred to experiments that were being made here with this tool steel. Up to this time the Bethlehem company has refrained from public reference to the matter. Today its forty acres of works in South Bethlehem was opened up to representatives of the technical press for a general visit, but more particularly for the purpose of witnessing tests of the tool steel, now used throughout a machine shop that is 1,375 feet long and 117 feet wide, employing about 600 hands and still working night and day notwithstanding depression of late in most branches of the iron and steel industry. Having discarded all other tool steels for the regular run of heavy work in this great establishment, and having filled a tool room with something like 200 tons of tools made by the new process, the officials of the Bethlehem company felt that they had gone far enough to warrant public announcement of what they had accomplished. Stories of wonderful attainments on account of tool steel discoveries had been heard many times in the past, and so it was decided in this case to wait until the job was complete; until practically all the tools of the works were using the new process steel and until there could be no doubt of what was said regarding it.

Representatives of the trade journals were met by Mr. H. F. J. Porter, Messrs. F. H. Taylor and Maunsel White for whom the tool steel is named, Mr. William H. Mitchell of the New York sales department and several heads of departments in the work. Mr. Taylor was formerly with the Midvale Steel Co. He now makes a specialty of shop organization and is at present engaged on that score with the Bethlehem company. This tool steel discovery is an outcome of his undertakings in reorganizing shop methods here. The services of the Bethlehem company's engineer of tests, Mr. Maunsel White, were of course enlisted with Mr. Taylor, and hence the name "Taylor-White" process.

BRIEF EXPLANATION OF THE PROCESS.

After greeting the trade journal representatives Mr. Porter explained briefly the conditions that existed at the works about two years ago when a reorganization of shop methods on a piece-work basis, which is still under development, was taken up. The casting works and forge were crowding the machine shop so that it was thought the capacity of the latter would have to be doubled. This would mean an expenditure of probably a million dollars. Attention was immediately directed to the question of speeding up machine tools. A first requisite in the piece-work scheme was a standard, uniform grade of tool steel, the use of which would be enforced upon all the men regardless of their preferences. The miscellaneous assortment of tool steels in the shop was reduced to six that were regarded as among the best. It was found that all of these were of practically the same chemical composition. Then several picked men were put to work testing the relative merits, not only of these tool steels but all brands of established reputation. A special lathe was set aside for experiments. Since the beginning of the investigation over 200 tons of steel forgings have been cut up into turnings on this lathe, and it is estimated that over $100,000 has been expended in labor and material. A still further large sum has been invested in the patents covering the process and in other matters attending the investigation. Hundreds of samples of all kinds of tool steel was a large item of expense. But this large investment, Mr. Porter said, had been more than returned in the past year alone by the saving in labor cost and larger output. The increase in cutting speed of the various machine tools throughout the machine shop had entirely reversed the inequality of balance existing two years ago, so that the capacity of the forge has had to be largely increased to keep pace with the rapidly-growing efficiency of the machine shop. In a few words it could be said that tools of this steel would work at an extreme of 1,100 degrees of friction heat, as against 600 or 700 degrees with other steel; that machine shop efficiency is four times what it was with other kinds of tool steel and that they hope to make it six times upon the establishment shortly of the piece-work system. Not much was said regarding the process, except that it involves a combination of heating furnaces and is practically automatic, so much so that any ordinary laborer can do the work and there will be no question at any time regarding the quality of the steel he gets out. The steel used is a special make, but it is not absolutely necessary that it should be so.

TESTS WITH EXPERIMENTAL LATHES.

Following the talk by Mr. Porter that brought out the above information, the machine shop was visited and cutting speeds of 20 to 30 ft. were noted in work on all manner of forgings for marine and stationary engines, on propeller shafts, gun forgings, ordnance material, etc. All main lines of shaft had been speeded up from 90 to 250 revolutions and further changes in this direction were, of course, being made as rapidly as possible.

In preparing for the first test with the experimental lathe above referred to, it was explained that several manufacturers interested in the treated tools had brought their own tools to the shop to be tried on the same pieces of work. The Bethlehem officials had requested them to do so. The lathe can be run at speeds from two to 300 revolutions per minute and will take work up to 60 inches in diameter. It is driven by an independent motor of 40 H. P., which gives ample power for any desired test. There was on hand, for the purpose of comparing the treated tools with others, forgings of steel of different hardness, running from the hardest tool steel to soft merchant steel, as well as wrought iron and castings of steel and cast iron. The first piece put into the lathe was steel of the very hardest kind. The cut was 3/16 in. depth and 1/16 in. lead and the speed 15 ft. This was worked for 15 minutes with the Bethlehem tool, cutting dry and turning off the blue chips at sizzling heat with no injury to the tool. Then a Mushet tool was put in. It was burned out in 23 seconds, practically as soon as it began working.

While another piece of material was being put into the experimental lathe, the visitors inspected the regular work of the shop. Near by was a small lathe, operated by a young man who was probably paid $1.50 a day. This lathe, working night and day, turns out about 450 test bars a week from samples of steel taken by army and navy inspectors. Eight men were required to do this work formerly, as it was necessary in former practice to first saw the test piece down to a size that would admit of the tool work. Now the test piece entire is put into the lathe and the "Taylor-White" Tool handles it without any difficulty whatever. The shop cost of one of these test bars was about $5 in the past. Now it is little more than $1. Not far away from this lathe a large planer, engaged on a soft piece of work, was running at 39 ft. speed. The depth of cut was ¾ in. and the feed ⅛ in.

A chilled cast iron roll, very hard, was the second piece in the experimental lathe. The speed was put up to 45 feet. The cut was the same as in the first case, 3/16 in. depth and 1/16 in. feed. This was worked with the Bethlehem tool for 16 minutes. The lathe was then stopped and the other kind of tool adjusted. As in the first case it lasted only a few seconds. In a third test the material was an ordinary piece of merchant steel and the speed was increased to 150 ft. The "Taylor-White" tool was kept on this job for about 4 minutes, and by looking under a dark covering it could be seen working red hot. When subjected to this treatment the other kind of tool, as before, lasted only a few seconds. The first tool was adjusted a second time and took up the job, again working red hot.

RECORD OF PROGRESS WITH THE NEW TOOLS.

In order that the rate of progress might be observed, records have been made of the amount of metal cut per hour per tool throughout the shop. The following table shows the increase in efficiency up to January of this year:

AVERAGE.	Oct. 25, 1898	May 11, 1899	Jan. 15, 1900	Per cent. of gain, Jan. 15 over May 11.	Per cent. of gain, Jan. 15 over Oct. 25.
Cutting speed.....	8 ft. 11 in.	21 ft. 9 in.	25 ft. 3 in.	16	183
Depth of cut.....	.23 in.	.278 in.	.30 in.	8	30
Feed.....	.07 in.	.066 in.	.087 in.	32	24
Pounds of metal removed per hour	31.18	81.52	137.3	68	340

Referring to the above table and to other matters pertaining to the tool steel is the following from the Bethlehem company:

"The gain shown in the table has been since increased by the further speeding up of other machines and the more general interest taken by the men with a fuller understanding of the changed conditions of higher speeds. The virtue of the "Taylor-White" process is that it gives to the steel the very valuable and exceptional property of retaining a high degree of hardness when heated to a visible red heat. It is possible with one of these tools to cut steel at a speed so great as to heat up the point of the tool to redness and have it continue to cut for several minutes at this speed, leaving an unusually smooth finish on the work, as well as cutting accurately to size. The advantage in leaving a smooth roughing cut and of having the work accurately to size will be readily appreciated, as it materially lessens the work of finishing. The practical speeds at which these tools will run has been found to be from two to four times that of any steels which we have experimented with, and we have endeavored to obtain the best in the market.

"The effect of our process, which is applied after the tool has been dressed or machined to shape, penetrates to the center of the steel, even in the largest tools we have ever treated, i. e., 4 in. square. All the standard brands of self hardening steel which we experimented with are improved to a more or less extent by the treatment. It is preferred, however, to use a steel of special composition, in order to get the greatest uniformity and maximum results. This special steel forges so much more readily than the general run of self-hardening steels that tools of difficult shapes may be easily made up. We have also discovered a simple and comparatively rapid method of annealing our special steel by which tools may be easily machined to shape, making it applicable to twist drills, chasers, inserted cutters, etc., which have heretofore not been made from self-hardening steel.

"A very important feature resulting from the use of this process is that the tools are uniform in quality, so that work on which they are used can be regularly performed at the maximum rate of speed. The variation in the quality of these tools does not run over 5 per cent., which insures a much greater degree of uniformity than is attained in any other tools that we know of, whether made either of tempered or any air-hardening steel. With uniform tools the piece-work system can be most efficiently used as the piece rate must be based not on the average cutting speed of the tools but on the speed of the worst tool in use. Another advantage in these tools is that when cutting dry at the rate of maximum efficiency the chips should come off blue. These blue chips enable a foreman at a glance to tell whether the work is being done at the proper speed. When running under water at the proper cutting speed the chips should show blue immediately upon shutting off the water and allowing the tool to cut dry for a few moments.

"The apparatus used in the "Taylor-White" process offers also a simple and effective means of heating any other tools at uniform temperatures which can be easily controlled, so that ordinary carbon steels can be hardened through the use of the same apparatus at temperatures which will insure greater uniformity and higher qualities in this class of steel, as well as in self-hardening steels. As is well known tempering steels of different makes and different qualities requires different temperatures for hardening to obtain the best results, therefore by means of our apparatus, which is capable of closely controlling temperature, these points may be accurately determined for each class of steel and made use of in daily practice. The operation of the process is extremely simple, as it is controlled by apparatus which regulates the different steps and does not require skilled or expert labor.

"Of course we have solved in this undertaking a great many problems connected with the speeding up of marine tools. This is an important question, as the gain is immediate and by a simple means. It is also great in proportion to its cost and therefore appeals at once to the engineering fraternity. More than a hundred concerns throughout the country have already sent their representatives to our shop to study the use of this steel and in many cases to make a competitive test with their tools against ours. The price of a shop right to use the "Taylor-White" process is

based upon the number of machines (as well as size and character) on which the treated tools may be used to advantage. A most important result, which must follow the more or less universal introduction of this process, will be the practical exclusion of the foreign brands of self-hardening steel which are now supplying over one-half the demand in this country."

A WONDERFUL IRON MINE IN NEWFOUNDLAND.

(Correspondence of the New York Tribune.)

The serious mining strike at Belle Isle, Newfoundland, in the last two or three weeks should direct American attention to what is the most remarkable hematite deposit in the world. What the gold reefs of Johannesburg are to the Transvaal the Wabana iron beds are to Newfoundland. They form immense deposits of rich red hematite ore, three miles long and several hundred feet wide, and showing 34,000,000 tons in sight above the water. The beds dip downward at an angle of eight degrees, and it is believed that they extend below the sea in practically unlimited quantity, though what is now in sight will suffice for a generation's work. To all intents and purposes the mine is open quarry. The ore is got at by chopping off a surface covering of earth and rock and then loosening the hematite with charges of dynamite.

The deposit is one of nature's freaks. It is a perfect reproduction of a tiled floor. Countless millions of cubes of mineral are laid out with rectangular precision, following the trend of the stratification, and these seem to have been cemented and forced together by some giant machinery in prehistoric days. Layer upon layer of these cubes is seen in a vertical section of the mine, and the lines of cleavage are as clearly defined and the general arrangement is as perfect as a child's box of blocks. The only difference is that one can not lift out one of these mineral cubes with the fingers, but a charge of dynamite fixed in a portion of the deposit by a steam drill shatters it for an area of many feet in every direction and separates the solid mass into its thousands of little bricks, each about three inches square, and as perfect in alignment as if produced by an artist. No mining, in the customary sense, is needed. The deposit lies open to the sun, and all the work involved is the loosening of successive sections and the gathering up of the fragments, which is done by men shoveling them into ore cars, which run on a light cable railway to a pier on the seashore.

The mine occupies the northern end of the island, and hard by is a sheltered cove, where a pier has been built, whence ten thousand tons of ore may be loaded in a day. The laden cars run down an incline by gravity, and are upset automatically, their contents falling into one of ten pockets constructed in the interior of the pier. Each pocket takes one thousand tons, and can be emptied into a steamer's hold in ten minutes. Two ships a day can be loaded there when business is brisk. The output for seven months last year was 310,000 tons. From 1,000 to 1,500 men are employed this year, as the output is to be trebled, and to do that the force of employes will have to be still further augmented. For years the surface workings will continue, and even when regular underground mining is required there will be none of the deep descents associated with coal and copper mines.

The ease of working and the proximity to tidewater make this deposit one of the most advantageous from an economic industrial point of view that capitalists could possess. The cost of mining the ore and putting it on shipboard is but 25 cents a ton, and the freight to Canada only 25 cents more, 50 cents being charged for its conveyance to Europe or the United States. It is in great demand in Germany, where ironmasters work it in very conveniently with poorer ores, and large quantities of it are also absorbed at Philadelphia and Baltimore. The price at which it sells there yields the owners of the Wabana mine a profit of $1 a ton, and as contracts for the delivery of 500,000 tons have been signed for this season it is very easy to see that there is a handsome dividend in it for the shrewd capitalists who control it. The strike was set on foot to secure an increase of wages from 10 cents to 12½ cents an hour for the men employed.

The mine has only recently passed into the possession of the Dominion Iron & Steel Co., the legal cognomen of the better known Whitney syndicate. This corporation purchased the property for $1,000,000, in order to have in it a supply of ore for the great smelting works it is erecting in Sydney, Cape Breton. With iron and steel commanding such prices in the world's markets as they do today, and with these conditions likely to be maintained indefinitely, the idea of a smelter on Canada's Atlantic seaboard had much to commend it. Mr. Whitney had already acquired control of most of the coal mines in Cape Breton, and limestone abounded, so that he had two important constituents right at hand. The third, hematite iron ore, was provided by the acquiring of the Wabana mine, and Belle Isle is only 400 miles from Sydney, with a continuous, unobstructed deep water passage from one point to the other, the ore running into the steamer's hold from the pier at Wabana and being hoisted out at the pier at Sydney, only a few yards from the ruddy mouths of the blast furnaces into which it is to be fed. No other similar industry in any part of the world can show such a combination of favorable conditions for the actual production of the commodity, in addition to which there is the equally important fact that Sydney is a deep water port, thereby obviating railway transport, and that it is only 2,100 miles from England, whereas New York is 3,100. By comparison with the American smelters in Pennsylvania and further west, and taking into account the railroad freights to the American seaboard, as well as the increased cost of ocean transfer, it is pointed out that the product of the Sydney smelter will be able to undersell that of any American competitor in the iron centers of Europe.

The Wabana mine is not the only deposit of its kind in Newfoundland, and at several other points in Conception Bay, where Belle Isle is, discoveries of the mineral have been made and the properties prospected by the Whitney people and others interested. The result has been to prove that the region has been very largely mineralized, and that many workable veins of hematite exist, the development of which will be undertaken by large English concerns within a year or two. The Spanish ores now so much used in England are beginning to fail, and the securing of others within reasonable distance of the manufacturing centers has become a necessity. Our hematite region should "fill the bill," as it is only 1,760 miles from the English coast.

But while these projects are more or less embryotic, that at Sydney is an actuality—so much so, indeed, that a duplicate plant is to be erected at North Sydney, a sister town. The first is now almost ready for the never ceasing furnace fires to be lighted. The plant will be the most complete of its kind in the world, for the promoters will have the experience of two continents to profit by. It will perform every process in the allied arts of iron and steel making, the ultimate forms of the latter—steel rails, structural pieces, and ship plates—being produced. The by-products of the coke will also be saved and converted into marketable commodities. Four blast furnaces, each with a capacity of 400 tons daily, are installed, as well as 500 ovens for the manufacture of coke. Steel mill, blooming outfit, rolling mill—everything essential to the supply of the perfected products in this line—will be installed, and the entire plant will cost $7,000,000. The company is capitalized at $20,000,000, provision being made for enlarging the plant if required, and also for the addition of a complete ship building plant if it is found desirable when the smelting enterprise is in full working order, to undertake the construction of iron and steel ocean ships in proximity to the smelters. The situation is admirable for this purpose, and, indeed, formed one of the reasons why Sydney was selected as the home of the enterprise. The harbor is large, deep, capacious, and easily accessible, and, as it is at the entrance to the Gulf of St. Lawrence and is a coaling port for ocean shipping passing in and out, its advantages are many and of a character to impress investors strongly.

The launching of such an enterprise as this, in an entirely new center and with such an array of favorable circumstances in its behalf, can not fail to be the occasion of much serious thought by those concerned in similar industries in the United States. That the Sydney project has come to stay is certain; the name of Henry M. Whitney as its president is the best proof of that, and it is equally assured that it will be a formidable competitor for existing manufactories. Its output—about 600,000 tons of pig iron and probably 300,000 tons of steel a year—will be sufficiently large to affect the markets and influence the prices for standard qualities. The establishment of a second smelting plant at North Sydney, by a group of English and Nova Scotian capitalists, will further intensify this condition, for the plant is to be of the same capacity and the requisite ore will be obtained from other points in Conception Bay. The preliminary work on this second plant has been started, and the required capital to finance the scheme is available. The ore deposit is exactly similar to that at Wabana, and equal ease and economy are anticipated in mining and shipping it. Therefore a shrinkage in the profits of the American smelters is inevitable during the next few years, for these Canadian concerns are further stimulated by a bounty from the Dominion government of $2 a ton on all pig iron produced.

COAL EXPORTS AND AMERICAN SHIPS.

Much interest in exporting circles and in the general business community attaches to the shipment from Philadelphia last Friday of a cargo of 9,000 tons of American coal to Hong Kong—the first shipment of this sort ever made, it is said, to a far eastern port. While some unusual, perhaps extraordinary, conditions have served to bring this about, and while present prospects may favor a continuance of coal exports and the establishment of the trade on a basis of permanency, by far the most interesting feature of the incident is the significant fact that this coal went abroad in a British bottom. The freight money will far exceed the value of the coal and it will go directly and permanently into the pockets of British ship owners, and represent so much gold withdrawn from this country, and become an item against us in the balance of trade account.

Even when it comes to shipments of coal for the use of the United States government in the Philippines the same humiliating spectacle is presented—the enforced chartering of a foreign ship. A correspondent of the Times notes the case of a British tramp steamer, the Avala, which recently arrived at Philadelphia from Java with a cargo of sugar and under charter to this government to take a cargo of coal to Manila. Her cargo of sugar was 5,225 tons, on which there was paid to the foreign ship owner 30s. per ton, or, in American money, $38,038. This sum is a specific subtraction from the gold credit, which is treated as belonging to the United States, inasmuch as the cargo is one charged against that country at its cost in Java. After discharging this cargo in Philadelphia, the vessel proceeded to Newport News and took on board 5,200 tons of coal, on which there was paid here to the foreign ship owner $7.75 per ton freight, in gold, to be carried out of the country. "These two items of freight," is the comment of the Times article on the incident, "amount to $78,338, which remains abroad, and, in order to obtain exact results, must be reduced by the sum of $3,788 for disbursements made by the captain in the United States during his unloading the imported cargo and loading the exported cargo, an exact account of which has been made and furnished for the use here made of it."

In the one item of sugar we import annually about 1,550,000 tons, and when it is considered that during the year 1899 of the combined imports and exports of the United States only 8.9 per cent. represented the amount carried under the American flag, the tremendous tribute that we pay to foreigners every year in freights may be faintly comprehended. We have suffered our merchant marine to dwindle to the mere shadow of a fleet, and now, with our foreign trade rapidly expanding, are forced to send a vast amount of gold out of the country in order to secure ships in which to carry the goods.

The average price of coal for shipment at the port of Baltimore is $2.25 per ton; recently the average rate of outgoing freights on coal has been $7.75 per ton; consequently, should we export 100,000 tons of coal from that port next month, the incoming revenue on it would be $225,000, while the loss in freights from having no present supply of American carriers would be $775,000. One of the local managers of a leading coal company gave it as his opinion that "while the inquiry from abroad for coal tends to strengthen the domestic markets, no great quantity will be purchased for foreign use until we are able to export it in our own ships."

If our coal exports are going to be dependent upon American ships for carriers, it is extremely difficult to see how that trade can be built up without a radical change from the present policy with respect to our merchant marine.—Journal of Commerce.

SHIP BUILDING COMBINATIONS.

AN ENGLISH VIEW OF THEIR ADVANTAGES SUGGESTED BY THE GREAT NUMBER OF INDUSTRIAL AMALGAMATIONS IN THIS COUNTRY.

(From Engineering, London.)

In the progress of foreign countries, notably the United States, towards equality in industrial eminence with Great Britain, a prominent and effective factor has been the combination of manufacturing establishments cognate to each other; and we are glad to note that in this country such legitimate amalgamations are increasingly popular. Three or four such unions have been effected within the past few weeks, and others are projected; so that it is not without interest to note the economic advantage. We have no intention of entering into the general question of foreign competition. Engineers are probably becoming weary of hearing variations upon the theme of British decadence. But whatever may be their feelings in this respect, they are, of course, quite aware that the only uncertainty about the struggle before them is as to its extent and proximity—as to when and to what extent the greatly-augmented producing capacity of the world will exceed the demand, now more or less abnormal and certain to diminish. In view of this, every improvement which makes for economy must be welcomed. Now, a direct result of such combinations as we have referred to—that is, the union in one firm of the diverse manufactures which are required to complete one piece of construction, such as a ship of war—is lessened charges of supervision, and, at the same time, a reduction in the time and cost of work, especially where all the contributory establishments are under common direction, and thus working in unison. Such an amalgamation may gather under one management coal and iron mines, blast furnaces, steel furnaces, rolling mills, and the finishing departments, as with the new Patent Nut & Bolt Co., who have absorbed the Dowlais works.

The case of the building and fitting of a steamship is probably the most representative instance that can be adduced of the advantages which are to be obtained by collecting a wide range of operations under the control of a single mind, or of one board. Under the conditions, still generally obtaining in this country, we have, between the raw material and the ship, the iron ore miner, the coal miner, the ship owner carrying the coal, ore, etc., the iron master, the steel maker, and probably the iron founder, forger, and marine engine builder, each involving separate and avoidable charges as well as profit. Under the new conditions which are aimed at by the combinations which have been perfected or are in contemplation, there would be far fewer intermediaries between the raw material and the finished product ready for its carrying trade. It is easy to understand under which conditions a ship would be more cheaply built. The new method would decrease the cost, but it would not necessarily raise the price, as is generally the result when many firms doing identical kinds of business are included in a "combine." The element of competition is not reduced when the steel maker joins forces with the ship builder. If a ship owner who wants a ship can get two or three builders to tender, he is not concerned where the steel and iron come from. What he is chiefly interested in, next to cheapness in cost, is quick, or at any rate, certain delivery, and unity of purpose on the part of those concerned in the various parts of the construction and fittings. Work carried out by a crowd of contractors, who have no common interest, can never be so well done as when the whole is executed by a single firm, and, although it may not be possible to point to faults that call for remedy, yet there is departure from that standard which merits the definition of "first-class."

The extension of this system of amalgamation has been further exemplified by the acquisition by purchase of the whole business of Robert Napier & Sons, ship builders and engineers, by Messrs. Wm. Beardmore & Co., steel and armor plate makers and forgers. This is the fourth combination of a similar nature within a year or two, and it carries an advantage from a national point of view, as it adds to our constructional resources for the navy. In Messrs. Napier's ship yard many warships have been built, beginning with the old Black Prince, one of the first two ironclads constructed; but the existing yard will be abandoned in a year or two, as Messrs. Beardmore have purchased a large area of ground at Dalmuir, contiguous to the famous Clydebank works, where new extensive ship building and engineering works will be laid down, and fitted with all machinery and appliances for constructing the largest warships and merchant steamers and their engines. For these vessels, of course, steel, armor, forgings, etc., will be made at the company's Parkhead forge, with which convenient facilities are arranged. This amalgamation, it will be recognized, is analogous to that between Messrs. Brown of Sheffield and the Clydebank Ship Building & Engineering Co., although thus far neither includes gun construction. Again, there was the Armstrong-Whitworth union and there have been frequent rumors about an addition of an engineering works to this company, as this alone remains to enable them to make a warship ready for action. The Vickers company, on the other hand, do everything; and it will be recognized that in the building of a ship at Barrow, economy must result from the co-operation of all the contributory departments. Thus, while the ship is on the stocks, boilermaker, marine engineer, and gun mounting mechanic are under the same direction as the ship fitter, and the work proceeds with unanimity of purpose. Questions of demarcation under separate contracts are avoided, a frequent source of trouble and delay. Again, there is no need for fitters' work to be undone for engineering or gun mounting work later. It follows that work will be cheaper; and with Armstrong, Vickers, Brown and Beardmore all anxious for warship work, there is no lack of competition. Besides, there are other firms, equally anxious, although combinations with armor or steel manufacturers have not yet been effected by them—Fairfield, Palmer, Laird, the Thames company and others.

Of other recent combinations, mention may be made of that carried out by Sir Christopher Furness, which includes, in addition to his ship building yard, the engine works of Mr. Wm. Allan, M. P.; of Furness, Westgarth & Co., and of another company, all on the North-East coast. These firms build machinery for merchant vessels of the cargo or intermediate class; but this amalgamation is not of such importance as those we have specially commended. The works are all alike, not cognate or dependent upon the other, and the economic advantage is not so effective from the point of view of the nation. Many other instances of combinations, useful from the point of view of international competition, might be instanced.

We referred some little time ago to the acquisition of important beds of hematite iron in Spain by the Millom & Askam Iron Co. and the Coltness Iron Co., and commented then upon the step as one which might be followed with advantage by other concerns. The competition of America and other foreign countries in the manufacture of iron and steel goods makes it incumbent upon our own manufacturers that they should effect all the economies and improvements possible in order to meet these rivals; and in the way of economies there is everything to be said for the control by a big company of its main sources of supply. All the leading American establishments do this, and much of their success is no doubt due to their foresight in acquiring and developing iron-bearing ground when it was cheap.

THE VIPER'S REMARKABLE RUN.

An unofficial trial of the Viper (steam turbine) was made on July 13 inst., when the record speed of 37.113 knots, or 43 miles an hour, was attained. Though the trial was unofficial there were present on board the Viper Messrs. Ball, Laughlin, Wright and Hobson, admiralty overseers, who checked the times, as well as the Hon. C. A. Parsons, Mr. J. Denny, Mr. Leyland, Mr. Marshall, Mr. Swinton and several other gentlemen interested in marine engineering. The trials were made off the Tyne, the vessel being under full steam for an hour, and making six runs between the posts, the first being done at the rate of 36.585 knots per hour. The second run was at the rate of 35.503 knots, and the third at the maximum speed above mentioned. Thrice more the vessel covered the mile, once equalling her best rate, and on the other runs doing 36.585 and 36.072 knots, the mean of the best two runs with and against the tide equalling 36.849 knots, and the admiralty mean of the six runs 36.581 knots. During the trials the turbo motors ran at a mean speed of 1,170 revolutions, the steam pressure being 200 lbs., and the equivalent I.H.P. about 12,000. The Viper is 210 ft. long, 21 ft. wide, with a draught of 7 ft. and a displacement during the trials, when she was carrying ten tons greater load than the contract stipulated, of 380 tons. The vessel was tried for speed in going astern, but, although she could travel backwards fast enough, she could not be steered, and the test was, therefore, abandoned until such time as the difficulty has been surmounted.

The Viper has four screw shafts in all, entirely independent of each other, the two on each side being driven by one high and one low pressure turbine respectively, of about equal power; while the two low-pressure turbines drive the two inner shafts, and to each a small reversing turbine is also permanently coupled, and revolves idly with them when going ahead. Two propellers are placed on each shaft, the foremost in each case having a slightly lesser pitch than the after one. The thrust from the screw shafts is entirely balanced by the steam acting on the turbines. So far as the boilers, auxiliary machinery and condensers are concerned, they are of the usual type in such vessels; but their size is increased to meet the much larger power to be developed and to compensate for the lesser weight of the main engines, shafting and propellers, as well as the lighter structure of the engine beds. The boilers are of the modified Yarrow pattern, with a total heating surface of 150,000 square ft. and grate surface of 272 square ft., while the condensers have a cooling surface of 8,000 square ft. Steam is admitted directly through a regulating valve to the high-pressure turbine driving one shaft, after which it passes to the adjacent low-pressure turbine, driving its shaft independently, thence it flows to the condenser, and both the shafts then drive the vessel ahead. The reversing turbine revolves with the low-pressure shaft, and being permanently connected with the vacuum in the condenser, no appreciable resistance is offered to its motion under these conditions. To go astern the ahead steam valve is closed, and the astern steam valve opened, admitting the steam from the boilers to the reversing turbine, and reversing the direction of rotation of the inner screw shaft. On the other side of the vessel the arrangement is the same, so that she can be maneuvered as an ordinary twin-screw vessel, and with great facility and quickness. In ordinary reciprocating engines the weight of machinery for each indicated H.P. developed is 55 lbs., while in the turbine the weight of machinery per indicated H.P. is said to be only 35 lbs., thereby effecting a great saving in weight. The engines are all below the water line—an essential factor in the construction of war vessels.

A PROSPEROUS YEAR.

The first annual meeting of Elder Dempster Shipping, Ltd., was held in Liverpool last week. The report and statement of accounts for the year ending April 30 were adopted and a dividend of 15 per cent. for the year was declared. The company was incorporated on May 3, 1899. The total profits for the period ending April 30, 1900, after providing for insurances, all working and management expenses, amount to £180,583 10s. 7d. Out of this sum the directors have created a sinking fund of £31,500 for the redemption of debenture stock, as provided in the trust deed, and have written off to depreciation account a further sum of £10,957 9s. 9d. They have also transferred to depreciation account £7,773, being the profits on voyages open at the date of incorporation of the company, and £1,844 10s. 3d., being the profit on the sale of the steamship Lokoja. The total amount thus set aside to the credit of the two funds being £52,075. The sum of £11,020 15s. 5d. has been credited to underwriting account. Debenture interest, trustees', directors' and auditors' fees, income tax, etc., absorb £29,054 4s. 10d., leaving a net balance of £98,051 0s. 7d., out of which sum the directors have, in accordance with the conditions of the prospectus, carried to a reserve fund the sum of £9,805, being 10 per cent. on the net profits, leaving £88,246 0s. 7d. available for dividend. An interim dividend at the rate of 8 per cent. per annum was paid in October last, and the directors now propose to distribute a further £55,000, making 15 per cent. for the year, and carrying forward a sum of £13,246 0s. 7d.

A sign of the times is the number of new steamship lines which are being organized. This is particularly noticeable in the south where new lines are being opened to our island possessions. Where new lines have not been formed new boats have been added to accommodate a growing traffic.

VARIAG'S REMARKABLE PERFORMANCE.

SHE MORE THAN EXCEEDS HER CONTRACT SPEED—THE BURSTING OF A HIGH PRESSURE CYLINDER MAKES NECESSARY ANOTHER TRIAL.

While speeding through the open sea at 23.7 knots an hour, on last Sunday evening, about 200 miles east of the Delaware Capes, a high pressure cylinder in the boiler room of the new Russian cruiser Variag burst. The high pressure cylinders are the first receptacle of the steam after it leaves the boilers. At the time of the explosion the pressure in the cylinder was 200 pounds to the square inch, and in the boilers 245 pounds to the square inch. Accidents of this kind aboard ship are usually attended with loss of life and injuries by scalding. Fortunately in the case of the Variag nobody suffered. When the accident happened the fleet cruiser was simply tearing through the water towards the Delaware, having completed seven and one-half hours of her unusually severe test at more than contract speed. The Russian officers on board expressed their delight with her, and were convinced that under favorable conditions she would have no difficulty at all in covering 25 knots an hour. That was the substance of a cable message sent yesterday to the Russian government.

Nevertheless, they will require another official trial until the vessel complies with the conditions specified in the contract. It is expected that the next trial with a new cylinder will be made in five weeks. The indications are that it will be about two months before the cruiser is ready to be turned over to the Russians for her voyage to the domains of the Czar.

The Variag was launched and christened in a howling storm, and she came limping up the Delaware from her trial trip with the rain pouring over her decks. But all on board were agreed that, in spite of the bad weather she encountered on this trip, the Variag behaved beautifully. When she was made fast to her wharf at Cramps' her masts were blackened with smoke, from her decks to the "good luck" brooms at their tops. Her outer works, as well as the engine room, showed the strain of the trial voyage, which was a far greater test of endurance than Uncle Sam's new warships are put to.

Not only the Cramps, but the Russian naval officers on board, were satisfied with the run she made. Every hour that she was under speed she was from four-tenths to seven-tenths of a knot ahead of her requirements, and that without any apparent effort. Captain Vladimir Behr said: "The Variag is easily the fastest cruiser of her class afloat. She more than meets our expectations. The accident was unfortunate, but it might have happened to any vessel under similar conditions. It is a marvel that no one in the boiler room was injured. I feel satisfied that the Variag can do 25 knots when put to it. She has already made 24.6 on one of the runs over the 10 knot course.

After the Russian officers came ashore they sent the following despatch to President Charles H. Cramp, who is at Newport Hotel, Bar Harbor:

Philadelphia, Pa., July 30.—Charles H. Cramp, Newport Hotel, Bar Harbor: In sending their congratulations to Mr. Charles H. Cramp the witnesses of the trial of the Variag desire to add that the ship has not only equaled, but surpassed, the great performance promised. We consider the Variag to be one of the great triumphs of naval architecture. (Signed) Stechensnovitch, Behr, Baron Faersen, Tchernigovsky, Makedonsky, Kraft, Fronzkevtch, Dr. Zohrt, Petroff, Dolgoborodoff, Skarokodoff, Richter, Sverbeieff, Leykoff, Barovsky, Soldateff, Roduira, Kelly, Zane, McIlvaine and Keleinikoff.

The Cramps prepared the following report of the official test of the Variag:

"The ship went from Philadelphia to the Maine coast where a measured course of ten nautical miles had been laid off for the purpose of determining the number of revolutions of the screws required to develop the contract speed of twenty-three knots. This was done by taking the mean of several runs back and forth over the ten mile course. The result was a decision by the Russian board of inspection that 147½ revolutions of the screws would be required to develop twenty-three knots speed. This occurred on Thursday, the 26th instant.

"The ship then returned to Boston and lay in the harbor until Saturday noon, the 28th instant, when she steamed slowly out to sea until 2 o'clock p. m., when the twelve hour continuous run was entered upon, the course being shaped to give Nantucket shoal a wide berth on the starboard hand; that is to say, the ship ran off to the eastward of the shoal. From this point a continuous speed of twenty-three and six-tenths to twenty-three and seven-tenths knots was developed for seven and one-half hours, when an accident to one of the high pressure cylinders compelled the shutting off of that engine, and, therefore, the abandonment of the remaining four and one-half hours of the twelve hour trial.

"The speed already developed, however, both on the run over the course off Boon Island and in the first seven and one-half hours of the principal run at sea, had so far exceeded the contract requirements that the Russian board of inspection has unanimously agreed that the essential conditions of the trial had been complied with, and that there should be no reasonable doubt of the ability of the vessel to maintain a considerable excess of the contract speed.

"A matter of importance to the United States in this connection was the performance of the Niclausse water tube boilers, the first that have been installed in an American built ship. Their performance, both in generating steam and in facility of firing, exceeded all expectations. The full horse power required was easily produced under natural draft, and while 10 per cent. of the furnaces were under process of cleaning and hoisting ashes, showing that the ship has a wide margin of excess of steam generating capacity. The average horse power developed in the run of twenty-three and seven-tenths knots per hour was about 17,000.

"Although considerable bad weather was experienced during the various phases of the trial, the ship proved extremely steady in all kinds of seas, demonstrating that she is as perfect a gun platform as a vessel of the cruiser class can be. The Russian officials, both members of the board of inspection, and Baron Faersen, the naval attache of the Russian Embassy, pronounce the ship the best of her class in existence. A speed of twenty-four and six-tenths knots was made on one of the runs over the ten knot course."

Asked whether there would be any ceremony when the cruiser is finally turned over to the Russian officers, the Cramps said: "No ceremony is talked of or considered necessary. When we deliver a warship to our own government we simply run her down to League Island and take a receipt for her. We suppose we shall do something of the sort in this case."

Commander J. D. Jerold Kelley, U. S. N., who was on board the Variag during her trial, says:

"The Russian cruiser Variag is the fastest cruiser afloat. For 7 hours and 26 minutes her average speed with natural draft was 23.7 knots. Over a deep water ten mile cruise against adverse wind and a jump of sea her maximum rate was, under similar conditions, 24.6 knots. These figures prove that in speed and maritime gait she surpasses every other ship of her type and of her approximate displacement. It is claimed unofficially that the first-class French cruiser Chateaurenault made 23.6 knots as an average and 25 knots as a maximum speed. But these performances were for a relatively limited rush period over a normal trial course. Then, too, the American model made her record with 17,000 indicated horse power, as compared with the 23,000 demanded by the French vessel. The Guichen, another French cruiser, developed a mean speed of 23.55 knots in a three hour run, but this required nearly 22,000 horse power. The superiority of the American hull is therefore incontestable. It is true that the Variag did not succeed in meeting the vigorous test imposed by the contract with the Russian government. The unexpected happened, and the rupture of one high pressure cylinder brought the trial to a close. This was a disappointment, indeed, a personal regret to every soul on board, but it did not affect the strong and general belief that the Variag had proved her ability, with nominal luck, to do even more than the spirit and letter of the agreement called for."

PRELIMINARY TRIAL OF CRUISER VARIAG.

On her official trial trip last week the new Russian protected cruiser Variag, built by the Cramps at Philadelphia, proved herself to be the fastest ship of her class in the world. Over a measured course of 10 nautical miles the Variag was gradually speeded up to 24.6 knots an hour, and in the teeth of a severe electrical tempest, which kicked up quite a sea and raised a mist that prevented the buoys marking the course from being quickly picked up on the ninth time over it. On this account recourse was had to the compasses, but they proved to be in need of adjustment, for they were found to be three-quarters of a point out, and naturally some little time was lost in getting back near the buoys. Despite these slight obstacles the Variag easily proved herself to be a triumph for American ship building, and it will be some time before a craft of her inches can develop greater speed. The maximum revolutions were 160. The Variag was under full steam for eight continuous hours. Though the blowers were working in the fire room the doors were not closed as they have been on American warships in trial trips.

It was estimated by the engineers that 20,000 H.P. was developed. The first three legs over the course the average revolutions were 100.4 and the average speed 16.12 knots an hour. On the fourth and fifth legs the average revolutions were 119.73 and the average speed increased to 19.07 knots. During the sixth and seventh legs the average revolutions were 141.1 and the average speed 21.93 knots. During the eighth and ninth legs the speed crept up slowly but steadily as the revolutions of the screws increased. The average revolutions for the two legs were 153.9 and the average speed 23.71. The eighth leg was covered in 26 minutes and 15 seconds, the screws turning 153.5 times a minute, and in the ninth, when the ten miles were reeled off in the remarkable time of 24.22 the screws were turning 154.3 times a minute.

The principal dimensions of the vessel are: Length on the water line 416 ft., maximum beam 52 ft., draught ready for sea 19½ to 20 ft., displacement 6,500 tons. Her coal supply is sufficient to take her 6,000 miles at a 10-knot gait.

Unlike the Colombiani and her sister, which are triple screw, the Variag is a twin-screw ship, her motive power consisting of two sets of triple-expansion engines which are to develop 18,000 indicated H.P.

The Variag has twelve 6-in. guns in her main battery, and twelve 3-in. guns in her secondary battery. Her auxiliary battery includes two 2.5-in. Baronovski, two 1.4-in. Maxims and six 1.8-in. Canet rapid-fire guns. The Baronovski guns fire a 5.6-lb. shot, the Maxims a 1.1-lb. shot, and the Canet pieces throw 1.5-lb. projectiles.

ELECTRICITY IN MODERN STEAMSHIPS.

The transatlantic liner Oceanic furnishes a remarkable example of the application of electricity in modern steamships. There are two separate dynamo rooms, each forming a water tight compartment that can be isolated in case of accident. Each plant contains two double cylinder engines, each of which drives directly a 100 H.P. dynamo at 240 revolutions; each dynamo can supply 1,000 lamps of 16-candle power. Two switchboards are provided, one in each room, and these are arranged so that the dynamos may work separately or in parallel. The installation feeds 1,975 lamps, including the signal lights; these latter are provided with an automatic device by which, when a lamp is broken, another is placed in the circuit; at the same time an alarm is given. A complete system of electric heaters is provided, these taking the form of radiators placed in nearly all the cabins; they consume about 1½ H.P. each, and will give three different temperatures. The ventilating system is also very complete; four large ventilators are driven by electric motors. In the kitchen an electric heating and cooking apparatus has been installed, and electric bells are used in great number, as many as 1,130 in all; these are arranged to give a single stroke during the day and a vibrating stroke at night. There are also fifteen different annunciator and indicating boards. The fog sirens are worked by a relay magnet and clock movement, by which they are blown for several seconds at regular intervals. —Scientific American.

Since the beginning of the present year the Russian, Austrian and Japanese navies have decided to fit Belleville boilers with economizers on the following ships: Russia, Pamiat Azova, cruiser; Austria, battleship of 11,900 H.P.; Japan, Matshushima, protected coast guard cruiser. The Compagnie Generale Transatlantique have adopted the latest type of Belleville steam generator for a 1,500 H.P. freight steamer of the Tarn class.

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The American ships now in Chinese waters under the command of Admiral Kempff are the Newark, Helena, Nashville, Yorktown, Monocacy, Oregon, Brooklyn, Castine, Don Juan de Austria, Monterey and Princeton. The British battleships are the Centurion and Barfleur (flag ships of Vice Admiral Sir Edward Seymour and Rear Admiral Bruce) and the armored cruisers Aurora and Orlando on the spot, just joined by the Undaunted from Hong Kong. The Endymion is also at Taku and the Terrible is expected with the Daphne. Other British ships are the Hermoine and destroyers Hart, Whiting and Fame, the Alacrity and the Algerine, sloop. The Russian squadron comprises the Navarin, Petropavlovsk and Sissoi Veliki; the cruisers Rossia, Dmitri Donskoi and Admiral Korniloff; the armored gunboat Gremiastchy; the gunboats Gaidmak, Vsadnik, Joreiets, Gilyak, Mandiour, Bobr and Sivoutch, and several torpedo boats. The Japanese have five or six ships at Taku, including the new cruisers Kasagi and Suma and two others will be added. The German division consist of the Kaiserin Augusta, Gefion, Hertha, Hansa and the gunboats Jaguar and Iltis; and the French division of the D'Entrecasteaux, Descartes, Jean Bart and the Surprise and Lion, gunboats, and are to be joined by the Guichen and Admiral Charnier. Italy is represented by the Elba and Calabria and Austria by the torpedo cruiser Zenta.

This was in effect the fleet when the bombardment of the forts of Taku began. Rear Admiral Kempff recently communicated to the navy department his reasons for not participating in the bombardment, and they appear to be sound and logical. He says:

I would state what follows in regard to the happenings previous to the resolve by other senior foreign naval officers here to get possession of the Taku forts.

On Thursday, June 14, Rear Admiral Bruce called and asked what I thought of the matter, and I informed him that I was not authorized to initiate any act of war with a country with whom my country was at peace; that my limit was to protect American interests, both by regulations and under recent instructions from both the department and from the commander-in-chief of the United States naval force on the Asiatic station.

On the 15th, at a consultation of the other foreign naval officers, it was agreed that the railroad station at Tongku should be taken (the railway is under Chinese government control), and in case any Chinese government force acted against the force of any foreign nation all should be involved and act unitedly. Under my instructions, I could not join in taking possession of Chinese government property, and did not care to become a party to such an agreement without special authority.

Yesterday, June 16, the same foreign officers signed a compact that it was necessary to take temporary possession of the Taku forts; and notice was served on the viceroy at Tien Tsin and on the commandant of the forts. Consuls at Tien Tsin were informed of what was contemplated. I did not join in the attack on the forts. Captain Wise, of the Monocacy, had orders to protect American interests, based upon department orders, but in case of attack by the Chinese government force, he was to consider it as a declaration of war and act accordingly.

He also added that he declined to become a party to the bombardment because he feared that it might endanger the lives of foreigners in the interior. Later, however, the Chinese government having shown a secret sympathy with the Boxers, Admiral Kempff made common cause with the foreign forces for the protection of foreign life and property. The Monocacy, which was moored out of line at the time of the attack, was repeatedly fired upon by the Chinese. The aim was deliberate and could not be construed otherwise than as an act of hostility to the United States.

The river Clyde is associated with everything that is foremost in ship building lines. The mind conjures a magnificent stream lined with industries. The Clyde is so easily the first that it is satire to speak of any other ship building center as second to it. One imagines the Clyde to be a natural river of majestic proportions. And yet the Clyde of today is practically a made river. The improvement of the Clyde began in 1770 when it had a depth of 14 inches at the present wharves of Glasgow. The program, insignficant now, was of considerable proportion at that time and contemplated a depth of 4 ft. The work of deepening the stream was undertaken by Mr. Colborne of the Clyde Navigation trust which was formed as early as 1759. From that modest beginning the artificial depth of the river has followed the development of ship building and its consequent increasing draught. In 1836 by the efforts of such eminent engineers as Telford and Renney the river was given a depth of 15 ft. at high tide and 8 ft. at low tide. Today the Clyde has a uniform depth of 30 ft. at low water and the biggest ship that floats can safely be taken into the center of Glasgow. But for this foresight in the early development of the stream Glasgow would not be today the great commercial, shipping and ship building center that it is. Over 15,000,000 have been expended in the development of the river and no one can say that it has not yielded an adequate return. There enters and clears at the port annually nearly 4,000,000 tons of shipping. Moreover nearly one-third the tonnage built in Great Britain is constructed on the banks of the Clyde. Clyde is a monument to an intelligent effort well directed.

The United States government is greatly in need of marines and is endeavoring to recruit at once 1,000 men for the service on war vessels in China. The opening which the service affords young men is excellent and doubtless many will take advantage of it.

THE COAL OF THE WORLD.

It is a curious thing that, while never was coal so plentiful, never was coal so scarce as it is just now. This may seem "a paradox, a paradox, a most amusing paradox," but it is strictly true. More coal is being produced in all parts of the world than ever was done before, yet in all the principal centers of consumption the demand is greater than the supply. It is probable that a change is about to take place, but we are referring generally to the position as it has existed for the last six or nine months, during which prices have risen from 50 to 75 per cent. It is, of course, a mistake (which some newspaper writers seem determined to perpetuate) to suppose that the Boer war has increased the consumption of coal; on the other hand, it has to a small extent restrained the production. For instance, in 1898 the collieries of the Transvaal, Cape Colony, and Natal turned out 2,487,669 tons; but it is doubtful if last year (1899) they turned out as much as 2,000,000 tons before the war put a stopper on some of them, while the reduction in output this year to date must be much greater.

The production of the United Kingdom last year was 220,035,000 tons, the previous largest output having been 202 130,000 tons in 1897. The increase was thus about 18,000,000 tons on the previous maximum, and the output of 1899 was 44,000,000 tons greater than that of 1889. In the United States the increase has been even more remarkable. The output of 1899 is stated by the United States Geological Survey at 230,-838,973 tons, but by our board of trade (on a New York non-official estimate) at 218,376,000 tons. The one estimate is probably as much too high as the other is too low, and we take 225,000,000 tons as approximating the correct total. This is 29,000,000 tons more than the previous maximum (in 1898), and no less than 99,000,000 tons more than in 1889, in which, however, the production dropped from the previous year. America, therefore, is not only now producing more coal than England, but is increasing her output at a greater rate than is England. Germany is the next largest producer, and last year turned out 101,622,000 tons, being 5,312,000 tons more than the previous maximum (1898), and 34,000,000 tons more than in 1889. France comes next with 32,331,000 tons last year, being 500,000 tons above previous record (1898), and 8,500,000 tons more than in 1889. Belgium comes fourth with 21,918,000 tons, which is a drop of 170,000 tons from the record output of 1898, but about 2,000,000 tons more than that of 1889. The following is the coal production of foreign countries as near as we can get at it:

COAL OUTPUT OF FOREIGN COUNTRIES.

	Tons.		Tons.
German Empire	101,622,000	Turkey and Greece	50,000
France	32,331,000	Portugal	25,000
Belgium	21,918,000	Holland	120,000
Russian Empire	12,185,000	China and Indo-China	3,000,000
Austria-Hungary	12,500,000	Netherlands-India and Borneo	150,000
Spain	2,672,000	Chili	500,000
Sweden	250,000	Mexico	500,000
United States	225,000,000		
Japan	5,500,000		
Transvaal	1,500,000	Total foreign coal	419,823,000

The above relates to bituminous and anthracite coal, in addition to which the following "brown coal," or lignite, is produced:

LIGNITE PRODUCTION OF FOREIGN COUNTRIES.

	Tons		Tons.
German Empire	34,203,000	Russia	150,000
France	603,000	Japan	20,000
Spain	70,000	United States	1,500,000
Italy	350,000		
Austria	22,000,000	Total lignite	63,896,000
Hungary	5,000,000		

Of course, although lignite cannot be used for all purposes, it is used for some purposes instead of ordinary coal, and therefore enters into the world's coal supply.

So far foreigners; now for the British Empire. The output of the United Kingdom is stated above, and under the British flag, India, Canada, and New South Wales are running each other hard for second place. That of India in 1898 was 4,604,980 tons, being 600,000 tons above previous record, and nearly 3,000,000 tons more than in 1889. That of New South Wales was 4,706,251 tons, being 320,000 tons above the previous year, and upwards of 1,000,000 more than in 1889. Each of these countries would produce at least 5,000,000 tons last year, though no returns are yet available. Canada in 1899 produced 4,566,000 tons, or 390,000 tons above previous record, and 2,000,000 tons more than in 1889. We take the following as the

OUTPUT OF BRITISH POSSESSIONS.

	Tons.		Tons.
India	5,000,000	Tasmania	55,000
Canada	4,566,000	New Zealand	1,000,000
New South Wales	5,000,000	Cape Colony	190,000
Victoria	250,000	Natal	350,000
Queensland	450,000	Total British Possessions	16,865,000
Western Australia	4,000		

Summing up, we have the following as the

WORLD'S OUTPUT OF COAL (1899).

	Tons.
United Kingdom	220,085,000
British Possessions	16,865,000
Total British Empire	236,950,000
Foreign countries	419,823,000
Foreign (lignite)	63,896,000
Grand total	720,669,000
Deduct lignite	63,896,000
Total ordinary coal	656,773,000

This is at least 60,000,000 tons more than was ever before produced in any one year.

Yet it has all gone into consumption, leaving the world unsatisfied. Of course, the consumption, both in gross and per head of population, is naturally greatest in those countries which make most use of steam traction and of steam machinery. But, while the largest aggregate consumption is in the United States, the proportion per capita is higher both in the United Kingdom and Belgium, in which coal is practically the only power-raiser. In America there is a large employment of other fuel, and of water-power. Yet the consumption there of coal is simply enormous. The following shows in the principal countries the

COAL CONSUMPTION, 1899.

Country.	Quantity. Tons.	Per capita. Tons.
United States	193,497,000	2.60
United Kingdom	153,798,000	3.83
Germany	88,141,000	1.62
Belgium	18,349,000	2.75
France	40,921,000	1.06
Austria-Hungary	17,171,000	0.37
Russia	15,114,000	0.11
Italy	4,414,000	0.14
Sweden	2,694,000	0.53
Spain	4,429,000	0.19
India	4,657,000	0.01
Canada	6,625,000	1.37
New South Wales	1,915,000	1.42
Victoria	805,000	0.68
New Zealand	957,000	1.29
Cape Colony	385,000	0.20

Note.—In the case of the United States and Russia lignite is included, not otherwise.

Some of these figures relate to 1899, and some to 1898, returns not being all to the same date; but they give a fair view of the relative positions. It will be seen that the countries consuming more coal than they produce are France, Russia, Sweden, Spain, Italy. Austria-Hungary, Canada, Victoria and Cape Colony. The only countries which have absolute surplusses over home consumption and imports are the United Kingdom, Germany, Belgium, Japan, the United States and New South Wales.—Fairplay.

WATER TUBE BOILERS.

THE FIRST LORD OF THE ADMIRALTY REPORTS UPON A SERIES OF EXPERIMENTS IN THE BRITISH NAVY—THE BELLEVILLE BOILER DEFENDED.

Mr. Goschen, first lord of the admiralty, submitted recently to the house of commons a memorandum respecting water tube boilers in the British navy. The memorandum is the result of a series of experiments extending over a period of three months and is most exhaustive in its character. In it he maintains that the lack of success on some ships with the Belleville boiler has been more personal than structural.

The experience gained with small tube boilers up to the present in destroyers, torpedo gunboats and third-class cruisers does not, in the opinion of the admiralty, justify their use in larger ships, though they have been adopted for the purpose in the French and some other foreign navies. It is stated that there are substantial advantages in adhering, as far as possible, to one principal type of boiler for all ships, as the whole service becomes quicker accustomed to its use, artificers, both in the ships and dock yards, become more expert in its repairs, and there is to a certain extent interchangeability of the spare parts and accessories which have to be kept in store. Trials have been made with Babcock & Wilcox and Niclausse boilers for comparison with Belleville boilers, but the trials showed no decided advantage of either over the Belleville boiler. These experiments were considered to justify further trials, and it has been decided to fit the Babcock & Wilcox in one of the new sloops, and possibly in one of the new second-class cruisers, and the Niclausse in a new sloop and in a first-class cruiser of the Monmouth type.

A comparison is made between the trials of the Highflyer and Minerva as forming the most direct comparison the admiralty have yet been able to make between the performances of Bellevlile and cylindrical boilers under ordinary sea-going conditions. The Minerva is fitted with cylindrical and the Highflyer with Belleville boilers. On the first sixty hours' trial at 10 knots the Minerva developed 1,083.8 indicated horse power, steamed 9.84 knots, and consumed 2.88 pounds per indicated horse power for all purposes; the Highflyer developed 1,190.5 indicated horse power, and steamer 9.8 knots on 3.46 pounds of coal, but owing to leaks, etc., one boiler was out of use 4¼ hours. On a run of 60 hours at 14 knots the Minerva with 3,028 indicated horse power consumed 2.33 pounds of coal per indicated horse power, and the Highflyer with 2,831.5 indicated horse power 2.90 pounds. On the first 30 hours' trial at the highest power obtainable the Minerva on 7,550.2 indicated horse power attained 17.53 knots on a consumption of 2.23 pounds (on this trial the forward main feed suction pipe burst); the Highflyer on the same trial indicated 7,946.3 horse power, and steamed 17.9 knots on a consumption of 2.52 pounds per indicated horse power. During the earlier trials the coal expenditure in the Highflyer was found to be very much in excess of that in the Minerva, and so large, compared with the results obtained on her contractors' trials, as to indicate either serious defects or want of skill in the management of the fires. The inspector of machinery was therefore sent on board, and after the stokers had been trained for 24 hours the first trial was repeated, with the result that the expenditure of coal was reduced from 3.45 pounds to 3.16 pounds per indicated horse power. It was afterwards found that the low-pressure slides and faces were much worn and not bearing satisfactorily, which would account for considerable loss of economy. After refit her expenditure of coal was, on a trip from Malta to Gibraltar (1,023 miles), 2.67 pounds per indicated horse power and her speed 13.16 knots, while that of the Diana, a similar ship with cylindrical boilers, at 12 knots, was 2.94 pounds, the former vessel burning 16 tons of coal less than the latter. The trials at the highest speed obtainable showed an advantage in speed on two trials of .37 and .94 of a knot in favor of the Highflyer. The Minerva's machinery, with cylindrical boilers, would have to be from 47 to 170 tons heavier to give this increased power. It is stated that economy largely depends on the stoking, and on the boiler being free from deposits, and in all respects in good order, but in many cases where the coal consumption has been large it has been found to be mainly due to defects in the machinery which, under the conditions of naval service, are very difficult to discover, the vessels being always kept as far as possible ready for immediate service. By the adoption of water tube boilers the steam pressure was increased from 150 to 250 pounds, which involved alterations of detail in the designs of practically all the auxiliary machinery as well as the main engines. The advantage of quick raising steam was, it is stated, illustrated in the case of the Niobe at Las Palmas when the Persia transport broke her shaft and was nearly on the rocks. The Niobe was able to get up steam and go to her assistance in 1¾ hours from the time of receiving the news. With cylindrical boilers it would have required five or six hours.

The following is taken from the conclusion in the memorandum:

Surprise is naturally felt by those who are not fully conversant with the whole of the circumstances that difficulties connected with the management of water tube boilers and high pressure machinery should take so long to overcome. A little consideration will show that up to the present, and for some time to come, the engine room staff of every newly commissioned water tube boiler ship must be largely composed of those who have had no previous experience of this type of machinery, as the number of water tube boiler ships in commission has up to the present borne so small a proportion to the total number of ships for which crews are provided. The rate at which crews can be trained will increase rapidly as more water tube boiler ships become available, and as special arrangements for training engineers, engine room artificers, and stokers augment the number of men with experience of these boilers.

There is no doubt that the advance from cylindrical to water tube boilers, with its accompanying great increase in pressures from 150 lbs. to 250 lbs. at the engines, has for the present added greatly to the anxieties of the engineers in charge of the machinery. This is inevitable when any change of this magnitude is made, involving as it does such a multitude of small details. It should be fully recognized that these officers have at first a difficult task, and that time is necessary to enable them to gain experience in the best way of dealing with all emergencies that arise under the new conditions.

Men-of-war must be designed to cope with those of foreign countries that they may have to meet in war, and no country can afford to relinquish such a decided advantage in speed for a given weight as the trials of the Highflyer and Minerva showed to be given by water tube boilers, or the great advantage of getting up steam and increasing speed rapidly, unless there were strong grounds for supposing that the numerous defects in details which now render the machinery somewhat less reliable than older and well tried types were likely to be permanent. This is certainly not the case. All the experience in our commissioned ships shows that the defects from which they at first suffered are being rapidly overcome, and it is practically certain that if we were to revert to cylindrical boilers and accept the sacrifice of speed or increase of displacement that it would entail, we should find that before the first ship was completed all the difficulties of detail which now give us trouble in water tube boiler ships will have been overcome and all our new vessels would be distinctly inferior to those of all other countries, with no compensating advantages.

Taking the results of the Highflyer's and Minerva's trials as they stand, and putting the 100 tons of weight saved in the machinery of the former into horse power instead of guns, the gain of speed due to the water tube boilers under practical sea-going conditions cannot be put at less than a knot, a result which is borne out in a general way by the comparisons of other runs of vessels with cylindrical and Belleville boilers respectively, though in these cases equally precise conclusions cannot be drawn from them, owing to the form and dimensions of the ships compared not being identical. Thus, if the admiralty of the day had not decided to put water tube boilers into the Powerful when she was designed, or the subsequent successive boards had hesitated to follow their policy, and had waited until the whole of the minor difficulties involved in the change had been overcome, the magnificent fleet which has been built. building, and projected since that time, consisting of twenty battleships, twenty-two armored cruisers, ten protected first-class cruisers, and nine second-class cruisers, making a total of sixty-one ships, would have had at least a knot less speed than they now will have, or an equivalent sacrifice would have had to be made in other directions, which to gain a knot at the high speeds now necessary would be very considerable in amount.

During the week the navy department decided to place merchant crews on board naval colliers and to assign merchant captains to the command of those vessels. This action was taken at the instance of Rear Admiral Crowninshield, chief of the bureau of navigation, who has advised the secretary of the urgent necessity of employing commissioned officers and enlisted men on ships of war in commission. This may be a step toward the abandonment of the collier system in the navy. It is understood that the bureau of navigation is in favor of chartering vessels for the transportation of coal instead of carrying colliers on the naval register. It is represented that much of the time these colliers are without cargoes and are under constant expense for maintenance.

The Bancroft, which has been ready for service for a year at the Boston navy yard, may be placed in commission and sent to Central American waters.

THE INDUSTRIAL SITUATION IN ENGLAND.

While the producing capacity of the country is at the present moment as fully occupied as most manufacturers could desire, and while all returns indicate great industrial activity the future is full of uncertainty. The cost of fuel, of raw material and of labor—all necessaries in manufactures—is becoming more and more prohibitive, and we have reached the stage when clients find it too hazardous to enter the market. Thus the average value of coal exported in the past six months was 5s. 6d. per ton higher than in the corresponding months of last year—15s. 9d. against 10s. 3d. per ton, and the price for home consumption has similarly increased. So also with metals, in the production of which fuel plays so important a part. As regards textiles, although the volume of the raw cotton imported in the six months has decreased 12½ per cent., its value is 16 per cent. greater; and in like manner raw wool has decreased 10 per cent. in volume, but has increased 8 per cent. in value. Stocks, of course, have been drawn upon, but they are not inexhaustible, and dear raw material must now be paid for as well as more highly remunerated labor, with the result that all along the line contract prices for manufactures are necessarily higher. Added to this tangible reason for hesitancy, on the part of the purchasers of shirts as well as ships, there is the unsettled state of foreign affairs. It is an undoubted fact, although not always explicable, that the effect of such international crises, as are now experienced, is more far-reaching than their geographical limits or their material influences, and is invariably a reason for the cautious buyer to delay orders. When the Transvaal trouble eventuated in war it was of little consequence that the result was a foregone conclusion; the check in the flow of orders was the same, and hopes were set upon a new impetus being given to trade so soon as peace was declared. But there has now come the China disaster, with its appalling crime calling for vigorous punishment. Under ordinary circumstances such a punitive war would not greatly influence the industrial situation; but, like the near eastern question, the problem of China and the jealousy of the powers incidental to it, has lurking around it immense potentialities for international conflict. These elements, therefore, aggravate the tendency of the capitalist not to commit himself to any large expenditure, already arisen in view of the high charges due to the threefold causes we have mentioned.

The unfailing adjustment consequent upon the relation, or predominance, of supply and demand must soon make itself felt. Coal, pig iron and steel are all obtainable only at inflated prices, owing to the excessive demand for labor, etc., and adjustment must result. The railway returns afford the readiest means of determining the effect of high coal rates. Enormous increases in gross earnings have been recorded—it is scarcely necessary to quote the figures—but instead of some part of the excess in receipts over previous years being available for dividend, the whole of it and more is absorbed in expenses; and we have this week the first indication in the big decrease in the dividend of the London, Brighton & South Coast Railway Co. The effect of dear coal is also instanced in the case of the almost universal increase in the price of gas. So with industrial concerns, the pig iron makers find that the margin of profit is vanishing, especially as reduced demand and the operation of large combinations of producers in the States, have tended to bring the price in America down by 20s. to 25s. within the past week or two. This applies also to such structural forms of steel work as are produced by a large number of firms; so that alike for pig iron and steel makers here there is greater danger of keen competitive rates being quoted to British users, and a consequent sudden increase in the imports from the United States. These exports from the United States to Britain have not grown much recently, owing to the great home demand, but it is only a question as to how soon there will be a production in excess of American needs.

These points are of greater importance in view of the many returns all indicating a "boom" in trade; but statistics as to production are retrospective, and the absence of new contracts renders them unsafe guides when considering the future of trade. Of course, it is satisfactory to know that the exports for the past six months are 14.1 per cent., and the imports 7.9 per cent., higher than in the corresponding period, and that exports of agricultural implements, steam engines and some other manufactures show almost similarly high rates of increase in value —8 to 9 per cent.; but it would be still more satisfactory to know that the amount of work in the order books now exceeds by 12 per cent. that standing to credit six or twelve months ago. Moreover, there are symptoms in these same Board of Trade returns which are not so reassuring as the general result. Exports which call for a great amount of skilled labor do not show a great increase. The value of railway carriages shipped is 40 per cent. less, of railway trucks and wagons 24 per cent. less, of cycles 23 per cent. less, and the weight of steel and iron manufactures 4 per cent.; of iron and steel wire 18 per cent., of railroad iron of all sorts 13 per cent. less, while the largest increases so far as the metallurgical or engineering trades are concerned are to be found in respect of more or less raw materials—pig iron showing an increase of 37.8 per cent.; old iron for remanufacture 59.6 per cent., unwrought steel 32 per cent., tinplates and sheets 26 per cent., and bar angle, bolt and rod iron 19 per cent. Increases in finished manufactures are few and slight.

In the case of ship building, a representative, if not our staple industry, we have authoritative figures from Lloyd's return. It is shown from the statistical abstract just issued that the tonnage of vessels commenced with the quarter almost exactly equals the tonnage launched, the former being 379,170 and the latter 378,389 tons, so that the condition of affairs does not seem to indicate any material change during the quarter. The tonnage of merchant ships now in process of construction is 1,265,313, as compared with 1,260,422 tons three months ago; but this apparently satisfactory maintenance of orders is illusory. It would be easy to name several firms who have launched ships without having orders for steamers to fill the vacated berths; and still more easy to prove that the number of orders booked has shown a very serious decrease during the past four months. Prior to this cessation some of the firms booked well in advance, and thus they still "commence" vessels in lieu of vessels launched; but, nevertheless, the orders going are now very few in number and of little importance. If the total work under construction is compared with the aggregate at the same period last year there is found to be a decrease of 10 per cent. Thus against the total of 1,265,313 tons now there were at the same time last year 1,386,367 tons, and at the beginning of last year 1,401,087 tons; so that the decrease from the highest point is 135.774 tons, and there is almost a certainty of still further reductions. The diminution is very largely in vessels for British owners.

The decrease is widely spread, Hartlepool alone showing a continuance of the figures of recent periods, while the neighboring port of Sunderland has only a slight decrease. On the Clyde there is a marked falling off. At Glasgow there are 103 ships of 238,794 tons on hand, while a year ago there were 294,684 tons, and eighteen months ago 306,041 tons, a decrease of nearly 25 per cent. At Greenock the condition is equally unfavorable. The builders in the district have fifty-six vessels of 169,090 tons, against 200,749 tons a year ago, and 214,859 tons at the beginning of last year. It is worth mentioning here that there are two sailing ships of over 3,000 tons building, and three others of over 1,000 tons. Recently no large sailing ships have been built. The tonnage in the Belfast yards is fairly well maintained, there being twenty-four steamers of 193,804 tons, as compared with the same number of steamers of 215,069 tons a year ago, when the highest total was touched. It will be seen that the average size of the steamers has decreased; throughout the United Kingdom there are building fifteen vessels of over 10,000 tons, and five between 9,000 and 10,000 tons—rather fewer than was reported in immediately preceding records. We have indicated that Hartlepool and Sunderland compare well with previous periods. At the former port there are under construction twenty-six steamers of 94,160 tons, and at the latter forty-eight vessels of 168,057 tons. Even at the two other northeastern ports, Newcastle and the Tees, the decrease is well under 10 per cent., the total being at the former seventy-nine vessels of 242,038 tons, and at the latter thirty-two vessels of 107,114 tons.

In warships, too, there is a considerable decrease, although the admiralty have several large ships to give out soon; but, on the other hand many of the vessels now classed as under construction are approaching completion, so that the prospects are that the four armored cruisers to be ordered will barely make up the tonnage completed. The state of affairs is as follows.

	July, 1900.		July, 1899.	
	No.	Tons.	No.	Tons.
Merchant Ships	499	1,265,313	568	1,386,397
British warships (contract)	38	210,550	40	183,230
British warships (dockyards)	16	158,000	18	166,970
Foreign warships (contract)	18	63,525	27	101,875
Total	571	1,697,388	653	1,838,442

It will be seen that there is a great decrease in the foreign warships building, and altogether the labor value of warship work is much less even than the comparison suggests. The decrease in ship building is only typical of nearly all industries, and our review of the prospects enables us to agree with the opinion of the president of the board of trade, expressed the other day at Liverpool, that as regards the employment of the people the highest point has been reached and that the prospects are not altogether exhilarating.—Engineering, London.

NAVAL MATTERS.

Rear Admiral Royal B. Bradford, U. S. N., chief of the bureau of equipment of the United States navy, visited Norfolk navy yard last Sunday. This Sunday visit is regarded as significant of the purpose of the government to begin preparations for active operations in China. There is now employed at this yard a force exceeding 2,400 men, about as many as were there during the Spanish war, when exceptional activity prevailed. The principal work now in progress is the refitting of colliers, of which four are being practically reconstructed. These steamers, in case of need, may be utilized for conveying stores and in certain contingencies might be used to some extent as transports. They will, however, probably be used as colliers, and they are being put in condition as quickly as possible. The purpose of the government to send the troops bound for China overland to the Pacific coast, there to embark, is evident. It is stated that several steamers have been chartered for use as transports. These are to be delivered to the government at the Pacific coast ports, one, at least it is said, at Seattle.

Orders have been issued by the navy department to fit out the old cruiser Mohican for a cruise. The intention of the department is to use the Mohican as a training ship for landsmen, and it is admitted that if the situation requires it the vessel will be sent to China and her crew in training, consisting of between 300 and 400 landsmen, transferred to other American vessels in Chinese waters.

The U. S. S. Mayflower, while passing under the Brooklyn bridge last week en route from the New York navy yard to Boston, had her main truck light carried away by contact of the main mast with the bridge. The mast was supposed to clear the bridge by 1 foot, but nevertheless the collision occurred. It has been decided to shorten this mast by 10 ft.

Orders have been received in Mare island to fit up the U. S. steamship Mohican for duty on the Chinese station and to have her in condition to sail in seven days at the most. She will not arrive in Asiatic waters until the end of October.

The board of inspection and survey have examined the Alliance and recommended that her machinery be removed and that she be turned into a sailing ship. The work will cost $75,000, and will be done at the New York navy yard.

The navy department has just made the second payment on account of the construction of the battleship Missouri at Newport News, and the ninth payment on work done on the battleship Maine at the Cramp yard.

The United States government is now negotiating with the owners of the steamers Australia, Zealandia, City of Sydney, City of Para, Ohio, Senator and City of Puebla to charter them as transports.

GERMAN ARMOR PLATE MANUFACTURE.

Richard Guenther, consul general at Frankfort, contributes the following letter to the state department on the subject of German armor plate manufacture:

In the report of the committee on naval affairs of the German parliament a letter was read from Baron von Stumm, one of the armor plate manufacturers, which he said he was compelled to write in consequence of statements in the newspapers. The business profits of the Krupp and Dillinger works on armor plates, he said, had been stated at 176,000,000 marks ($41,888,000). The new armored ships required 49,000 tons of armor material at a cost of 113,000,000 marks ($26,894,000). Therefore, even if it were taken for granted that half of the price constituted a clear profit, this would only amount to 56,000,000 marks ($13,328,000), which, divided over sixteen years, would be 3,500,000 marks ($833,000) annually, or 1,750,000 marks ($416,500) for each concern. The manufacture of armor plate, he continued, was very difficult; within twenty years the method of manufacturing has had to be renewed three times. The least mistake results in rejection, which imposes heavy loss. For years the prices of armor plates had not been raised, although wages and cost of raw material had doubled.

In answer to this letter it was argued that the total demand for armor plate, based upon the estimates for new vessels and remodeling, for the next sixteen years would amount to the sum of 260,000,000 marks ($61,880,000), not to 113,000,000 marks ($26,894,000). If, therefore—as would seem to be admitted in the letter—half were net profit, this would amount to 130,000,000 marks ($30,940,000), which would be derived by only two firms. A net profit consisting of half of the contract price was exorbitant. A termination of the monopoly, either by the establishment of works by the empire or by participation of reliable competitors, was urged. The inquiry was also made whether the nickel-steel armor of those vessels which had to be replaced could not again be used. The representatives of the government replied that an answer to this question could not be given at present, inasmuch as the condemnation of old armored ships so far had not applied to nickel steel armored ones, but only to common iron armored ships, and these armors are no longer used. The monopoly question was of great importance to the navy department; such monopolies existed not only for armor plate, but also for guns and ammunition. The manufacture by the empire would be an enormous undertaking; furthermore, it was not certain whether the profits on armor plate were really as high as they appeared, when the capital invested is taken into consideration. The aim of the department was to create competition and to break the monopolies. The speaker was of the opinion that this could be done, all the more if by the passage of the bill permanent business for ship builders were guaranteed. One of the members said that it had been recently stated in parliament that England was building her ships 20 per cent. cheaper than other countries. If this were so it would make a difference of 248,000,000 marks ($59,024,000) to Germany on her new and remodeled ships. The representative of the German government replied that the reason might be that the English ship yards were well appointed in every particular, that material and coal were somewhat cheaper in England, and especially that keener competition existed in England between the ship builders.

CONTRACTS FOR KRUPP ARMOR FROM RUSSIA.

The Bethlehem Steel Co. this week received word that a contract had been awarded it by the Russian government for 2,000 tons of Krupp armor. The armor will be used on the three new Russian vessels, Alexander III., Orobino and Orel, all of which are now building at St. Petersburg. While the officials of the company do not give out the price a ton to be paid for this armor, it is said to be considerably above that for which it has heretofore been offered to the United States government. The contract requires that the armor be delivered in fifteen months.

The armor for the Russian battleship Retzivan, building at Cramps, Philadelphia, is nearly all completed. At the recent ballistic test of turret armor for the Retzivan the result was so excellent that it is believed to be a considerable factor in awarding the present contract to the company. French and German armor makers competed for the contract.

The Carnegie Steel Co. also secured a contract from the Russian government to supply 2,300 tons of Kruppized armor plate for the battleships Alexander III., Orel, Borodine and Prince Howoroff. It is said that this order amounts to $1,500,000.

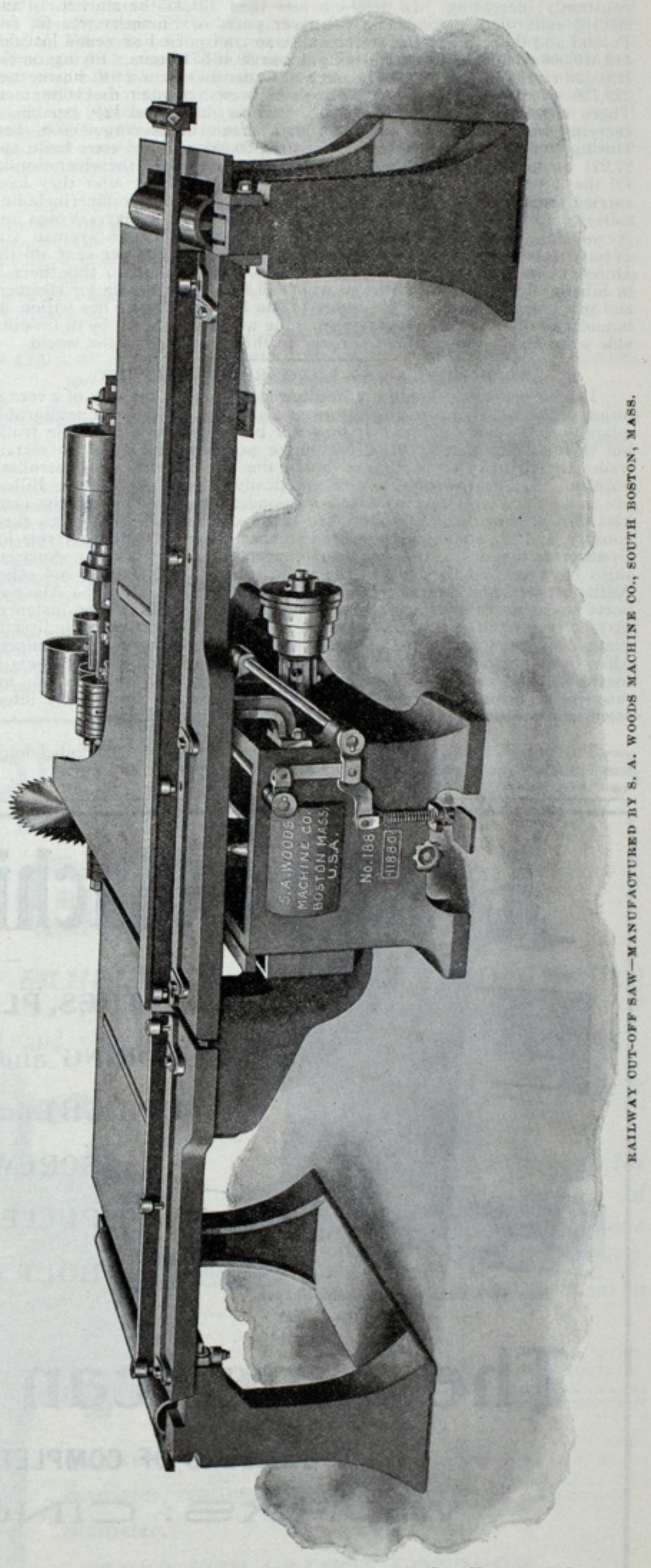
A NOVEL SHIP YARD.

The greatest novelty connected with the works of the New York Ship Building Co. at Camden, N. J., when completed, will be the immense glass-covered dry dock and ship building shop, for which a small portion of the steel frame is already in place. As it now appears, there is the immense steel structural work with three gables facing on the water front of the Delaware river, rising to a height of 150 ft. and covering a frontage on the water of about 400 ft. The 200 feet to the south will be utilized for a completely encased series of dry docks and a ship building shop, so that work can be proceeded with during the winter and summer alike, and that war and other vessels can be built without being exposed to the observation of any persons other than those engaged in the construction and the company's executives. These dry docks and shops will be built of steel and with glass walls, and will be under one glass roof. The height will be 150 ft. and the width 200 ft. This glass and steel structure will extend 900 ft. out into the Delaware river and will easily permit of work being done simultaneously on four of the largest naval vessels, from the keel upward. This part of the yard will eclipse anything of the kind in the world and will avoid the usual delays incumbent on the unpropitious seasons and the weather.

Five thousand people witnessed the launching of the United States torpedo boat destroyer Dale at the W. R. Trigg ship yard at Richmond, Va., on Monday. Among the prominent people were Mayor Taylor and Gov. Tyler and Naval Constructor Grosbeck of Washington. There was some little difficulty in knocking the props, and launching was delayed nearly half an hour. The boat took the water smoothly amid great cheering. Miss Mary Hasell Wilson of Philadelphia, a direct descendant of Admiral Dale, for whom the boat is named, acted as sponsor.

RAILWAY CUT-OFF SAW.

The high-power feed railway cut-off saw illustrated herewith was recently placed upon the market by the S. A. Woods Machine Co. of South Boston, Mass., and is designed for cutting up lumber into accurate lengths. It will cut off timbers 14x16 in. or boards 30 in. wide, and carries saws up to 40 in. diameter. The saw carriage is operated by power feed, with three speeds. It is under control of the operator by action of treadle, and is provided with quick automatic return. A tension device for the driving belt keeps the latter tight, and the



RAILWAY CUT-OFF SAW—MANUFACTURED BY S. A. WOODS MACHINE CO., SOUTH BOSTON, MASS.

pneumatic pulley on the saw arbor effects a saving of 25 to 35 per cent. in power, being so arranged as to prevent air-cushioning of the belt. The arbor may be made long so as to enable the operator to use a gaining head, when so ordered. The rolls in the table support the stock and permit its easy movement. The table can be lengthened by an attachment of wood or iron as desired, for which additional floor stands, each containing a roll, can be supplied.

The fence or guage is extra heavy, and adjustable stops are furnished, which can be quickly set for duplication of work. The stop bar as made is interchangeable, with fences on both sides of saw. With the countershaft, which is self-contained, is included a patent self-oiling loose pulley. Prices and full details of this and other high-grade wood-working machinery will be furnished by the Woods company upon application.

WATERWAYS OF RUSSIA.

No country in Europe possesses such a magnificent river system as Russia, penetrating into the very heart of the country and a majority of the rivers are navigable for small craft from their mouths to their source. There is in European Russia 33,046 miles of navigable rivers and 870 miles of canals, forming a grand and extensive network of waterways 33,916 miles in length. The water-borne commerce is simply enormous and is constantly increasing. In 1899 no less than 131,355 small vessels and 260,105 rafts were unloaded at the river ports of European Russia and Poland and the value of the merchandise so transported exceeded in value 412,510,000 roubles and its total weight was 30,404,710 tons. Plying on the Russian rivers (exclusive of Finland and Caucusus) were 2,640 steamers of 229,750 nominal horse-power and their crews numbered 42,689 men. There were besides 20,580 vessels of various denominations capable of carrying about 10,500,000 tons and with crews numbering 95,608 men. During last year 603 new steamers (costing 20,595 roubles) were built, and 27,271 boats (costing 31,078,000 roubles) were added to the river flotilla. Of the latter the greater number is destroyed each year after they have carried their cargoes to tide water. Of the whole river traffic (including rafts) of European Russia 67 per cent. is done upon the rivers Volga and Neva—the remainder being 28 per cent. on the Dnieper-Nyeman and Western Dwina system, 3 per cent. only on the Don, 1.4 per cent. on the Dniester, and 1.1 per cent. on the Narova. In addition to this there is in Siberia 27,920 miles of rivers of which 16,366 are navigable for steamers and in Central Asia 2,745 miles more. The Russian empire has within its boundaries the grandest river system in the world which will be of inestimable value in opening up that country to the commerce of the world.

BRITISH FLAG NO LONGER PRE-EMINENT.

Insular prejudice should not be allowed to stand in the way of a recognition of the fact that foreign ship owners are now no longer a negligeable quantity in shipping affairs. It may not be altogether a palatable truth, but there is undoubtedly good reason for pointing out that in certain trades the British flag no longer holds the pre-eminent or controlling position. Spanish owners are now practically in possession of the Bilbao ore trade, or at least can exercise a preponderating influence on the market. Greek ship owners monopolize many of the coal freights to their country, and are sometimes prepared to charter on extra cheap terms for Grecian ore cargoes, as the charterers concerned are well aware. Austrian ships have secured the bulk of the trade from Fiume, Trieste and other Adriatic ports, and French vessels are excluding ours from the Algerian ports so far as cargoes back to France are concerned. Other instances may be readily cited, and the question of subsidies directly and indirectly granted to foreign ships is a subject which will become more prominent when trade is again depressed. Competition with foreign ship owners is inevitable, and cannot of course be restricted by any conference or arrangement; but in many other matters all ship owners are equally interested, and mutual support ought to be forthcoming.—Fairplay.

The new fireboat Samuel H. Ashbridge for the city of Philadelphia was launched last Tuesday from the ship yard of Neafie & Levy.

TRADE NOTES.

The Ashton Valve Co., No. 271 Franklin street, Boston, Mass., have issued a pocket edition catalogue of their fittings for steam vehicles. The first vehicle treated is the Ashton pop safety valve, constructed for boiler pressure up to 250 lbs. per square inch. These valves are made of the best steam metal and fitted with springs of Jessop's steel. The Ashton cylinder relief valve prevents the blowing out of cylinder heads. They give automatic relief and are guaranteed. The Ashton duplex steam and air gauge is practically two gauges combined in one case. One of the gauge hands in black indicates the steam pressure in the boiler and the other hand in red gives the pressure of air in the gasoline tank.

The Babcock & Wilcox water tube boiler is in use, or on order, for upwards of 100 vessels; in passenger and cargo ships and in warships. And while the existing plant at the company's large works at Renfrew on the Clyde is being worked to its fullest capacity—day and night shifts being the rule—the company is, we are told, experiencing difficulty in meeting the increased demands for prompt delivery. It has, therefore, commenced the laying down of additional plant and workshops, which will be devoted to the production of the marine type of boiler alone. The new shops will be lighted throughout by electricity, and electric motor driving of the machinery will also be extensively adopted.

The North Atlantic squadron, under command of Rear Admiral Norman H. Farquhar, sailed this week from Newport for New London. The fleet consists of the cruiser New York (flagship) and the battleships Indiana, Kearsarge, Massachusetts, Texas and Kentucky, the latter making her first cruise. While on the cruise the Kearsarge will go to Portsmouth, N. H., to receive a bronze shield, a gift of the state of New Hampshire. It is expected that before the fleet returns the Indiana will be detached and ordered laid up for repairs.

The French minister of marine has given the order for the two new cruisers, the building of which is authorized by the bill recently passed in the French chamber, to be put in hand at Brest and Cherbourg. The cruisers will receive the names Jules Ferry and Leon Gambetta, and will be precisely the same build. The length of each will be 476 ft., beam 71 ft., displacement 12,400 tons, engines 24,000 H.P.

A report has been received at the navy department of the disabling of the collier Scindia at Gibraltar. It will be necessary to send the new boiler tubes to the vessel from this country probably, and this will serve to delay the ship which is under hurry orders to China laden with coal from Cardiff for ten days.

The Nickel Plate road offers the low rate of one cent a mile travelled to Chicago for the annual encampment of the G. A. R. Tickets on sale Aug. 25 to 29, inclusive, good returning until Aug. 31 inclusive, or by deposit until Sept. 30 inclusive. Write, wire, 'phone or call on nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 154, Aug. 29

RUSSIAN NAVIGATION AND TRADE—A BRITISH VIEW.

Judging from the earnest efforts being made by Russia to increase her share in the maritime trade of the world, it is the opinion of the Allgemeine Schiffahrts-Zeitung that it will not be long before the other maritime nations will find a redoubtable competitor in the Russian mercantile marine. Already, indeed, it has got to be anything but a negligeable quantity. The protective measures adopted by the Russian government are doubtless the cause of much of the progress made, offering as they do a vivid contrast to the discouraging attitude often taken up towards ship owners and their interests by our own government. Among the most important measures of the kind may be mentioned the exemption from import duty of merchant ships and their appurtenances introduced into Russia, and the restriction of coasting-trade privileges between Russian ports (no matter in what part of the world) to vessels under the Russian flag. Certainly it is hardly possible as yet to strictly enforce the last named regulation for want of the necessary tonnage, but there is no room for doubt that it will be gradually put into practice as time goes on. The establishment of new commercial ports in the Arctic ocean, Corea, and China, although primarily of political significance, is another factor which will have its influence on the extension of Russian trade and navigation. Especially great have been the strides taken by Russian maritime commerce since the acquisition of points of advantage in the far east. The place of the not altogether successful Russian company for navigation and trade, which many years ago began to send a couple of vessels annually to Vladivostock, has been taken by the Volunteer fleet, founded in 1878 in Moscow by the company for the revival of Russian maritime trade, and by means of the magnificent steamers belonging to this fleet—sailing partly from Odessa and partly from St. Petersburg—a regular connection is kept up between Europe and Russian Eastern Asia. In the course of the last twenty years other ventures of the same kind have been made and discontinued after a more or less short career of unsuccessful efforts, and it is only in quite recent years that new life has been instilled into Russian maritime commerce. Last year, for instance, the Russian East Asiatic Steamship Co. of Riga, commenced active operations, and, in the course of last winter, despatched three of its large boats to China, Port Arthur and Vladivostock, and is now working in conjunction with the East Asiatic company of Copenhagen. More recently still the Russian Baltic Steam Navigation Co., also of Riga (and in which the Riga firm of Helmsing & Grimm is deeply interested), has entered the field of competition and has already sent two steamers to the Far East via Hamburg and Odessa. All this is, of course, the natural consequence of the rapid extension of Russian interests in Eastern Asia.

The extension and improvement of existing harbors and the laying down of new ones is another feature of latter day Russian commercial policy, illustrated, in the case of Europe, by the remodeling of Windau Harbor in the Baltic and the opening of the new port on the Murman coast (Port Catharine or Alexandrovsk), not to mention other schemes. In the Far East, too, after having secured a footing at Port Arthur, the Russians are arrogating to themselves a position in the south of Corea, having already, within the last few weeks, obtined at least partial possession of the port of Masampo, right opposite Japan. That Russia will ever become such a formidable competitor in the ocean carrying trade as Germany has already become is very doubtful, but we must be prepared to see a gradual increase in the share taken by the Russian flag in the maritime commerce of the world.—Fairplay.

The schooner Pretoria was launched from James Davidson's ship yard at West Bay City last week. The vessel is 350 ft. long, 45½ ft. beam and 24 ft. deep. The Pretoria when launched was already for sea, and even her sails were bent and running gear all rove when she went into the water. A large pony boiler is supplied, which is situated forward, and this furnishes steam to all the steam appliances. The vessel is steered by the latest improved hydraulic steering gear. A large deck hoist and combination pump is situated amidships for use of moving at dock or hoisting sails or cargo.

The thirty-fourth annual encampment of the G. A. R. at Chicago. For this occasion the Nickel Plate road will sell tickets at one cent a mile travelled on Aug. 25 to 29, inclusive, good returning until Aug. 31 inclusive, or by deposit until Sept. 30 inclusive, on any one of our peerless trio of daily express trains where scheduled to stop. Write, wire, 'phone or call on nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 150, Aug. 29

VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland, date of August 2, 1900.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	32½	32⅞	32	32¾
American Steel & Wire, Pfd.....	.....	.....	.....	.....
Federal Steel	31¾	32¼	31¾	32⅛
Federal Steel, Pfd.....	65	.....	.....	65
National Steel	24	.....	.....	24
National Steel, Pfd.....	.....	.....	.....	.....
American Tin Plate	22⅛	.....	.....	22⅛
American Tin Plate, Pfd.....	78	.....	.....	78
American Steel Hoop.....	19	19	17½	18⅛
American Steel Hoop, Pfd.....	.....	.....	.....	.....
Republic Iron & Steel	10½	10½	9	9½
Republic Iron & Steel, Pfd	50¼	51¼	49	51¼

SHIPMENTS OF SEAMEN ON AMERICAN VESSELS.

Reports of United States shipping commissioners for the year ended June 30, 1900, rendered to the bureau of navigation show 142,632 shipments, discharges and reshipments of seamen on American vessels at those offices compared with 122,468 for the previous fiscal year. The expenses have been $55,431 compared with $53,651, the average services per man cost 39 cents, the lowest in the past seven years. Besides duties enumerated the commissioners at various ports have assisted without pay in the shipment of crews for army transports. There are now twenty commissioners' offices, the office at Mobile having been re-established and an office established at Honolulu on June 14. Shipments, discharges and reshipments at New York were 48,469 compared with 35,627 for the previous year. Boston and Port Townsend show considerable increases. Shipments and reshipments aggregate 90,325, divided by nationalities into Americans, 32,333; British, 18,480; Scandinavians, 16,735; Germans, 8,449; Italians, 1,186; French, 635, other nationalities, 12,506. These figures include in many instances repeated shipments of the same men. The percentage of Americans is thirty-five, compared with thirty-six the previous year, mail steamships raising the American average. The number of Scandinavians is practically unchanged, the increase being in German and British subjects. Shipments and reshipments on steam vessels numbered 47,409 and on sail vessels 42,916.

AN ECONOMICAL STEAMER.

The performance of the Simon J. Murphy, latest steel freight steamer built by the Detroit Ship Building Co., is undoubtedly the cause of a great deal of satisfaction to officers of that company. She made the run from Detroit to Duluth and then to Buffalo (loaded between the two latter ports) on about 170 tons of fuel. Her speed, loaded, was 12 miles average. The cargo, taken on at Duluth, was a very large one—247,000 bushels of wheat. With this load and about 125 tons of fuel the mean draught of the steamer was 17 ft. 10 in. This cargo of wheat is equal to 6,616 gross or 7,410 net tons. The owners of the Murphy have what is probably the most economical ship on fresh water.

The Maryland Steel Co., Sparrow's Point, Md., has secured a contract to construct four new boilers for the steamship Essex of the Merchants' & Miners' fleet.

CHART NO. 1 OF ST. MARY'S RIVER has just been issued. Vessel masters of the great lakes have been looking for it for a long time past. It shows on a very large scale all the lower part of the river extending down from the lower end of Mud lake, where chart No. 2 begins, and including Detour, Drummond island and the lower part of St. Joseph's island, east and west, extending over to what is known as the North channel. This chart may be had from the Marine Review at 50 cents, or all three charts of the river at $1.50.

NORTH GERMAN LLOYD LOSSES.

The following statement regarding the financial loss sustained by the North German Lloyd Steam Ship Co., by reason of the recent fire in Hoboken, was issued last week, having been received from the main office in Bremen:

"The loss accruing to the North German Lloyd by the Hoboken disaster is estimated by the officials of the company at $2,250,000, which is nearly covered by the insurance reserves. Should it prove, however, that the engines and boilers of the three damaged boats are uninjured the loss would be reduced to between $750,000 and $1,000,000.

"The accounts published with the last annual report show that on Dec. 31 last the insurance reserve fund stood at $50,000, the renewal fund at $1,136,540, insurance fund $1,983,741, reserve fund $720,731. The book value of the sixty-four ocean vessels stood at $23,133,750, the value of each individual ship not being given."

One of the directors of the company, speaking of the disaster at Bremen, said that the consequence had been greatly exaggerated by the shareholders. "Although," he added, "the loss is certainly a serious one, it happens in a year when the earnings promise to be amply sufficient to cover the damage without involving any loss of dividend to the shareholders."

CONSTRUCTION OF FOUR SUBMARINE BOATS.

The Holland Torpedo Boat Co. has notified the navy department that four of the six submarine boats authorized by congress will be built by Lewis Nixon's firm at Elizabethport and two of the boats by the Union Iron Works of San Francisco. The plans for these six boats are being considered by the board of construction. The specifications call for a craft somewhat larger than the Holland and smaller than the Plunger, the latter being in course of completion at Richmond, Va. A contract with the Holland people will permit considerable latitude and will not be severe in governmental requirements.

The Rowanmore for the Johnston line of steamers has made her maiden trip across the Atlantic. She was built by William Connolls & Co., Glasgow, Scotland. She is the largest vessel touching regularly at the port of Baltimore. She is 540 ft. long, 59 ft. 4 ins. beam and 40 ft. 6 ins. to the spar deck. She is driven by triple-expansion engines with cylinders measuring 32, 52 and 86 ins., with a common stroke of 66 ins. She is fitted with four masts, twenty-six derricks and fourteen steam winches for handling cargoes. She has accommodations for thirty cabin passengers. She has capacity for 800 head of cattle under specially arranged shelter decks.

An important item in iron and steel circles is the announcement that the Carnegie Steel Co. is about to undertake the manufacture of rods on a very large scale.

ATLANTIC AND PACIFIC COASTS.

NO NEW CONTRACTS NOTED, BUT PROGRESS OF CONSTRUCTION CONTINUES FAVORABLE.

The large ferry boat Kittery, which has been building at the yard of David Clark at Kennebunkport, Me., was successfully launched last week. She is the first craft of the kind ever built in that vicinity, and is for use on the Piscataqua, between Portsmouth and Kittery, in connection with the Portsmouth, Kittery and York railroad. She will proceed in a few days to Portsmouth, under her own steam, all her machinery having been put in place before she left the ways. The unusual spectacle of a launching by moonlight was witnessed by many of the townspeople and quite a number of summer visitors, to whom it was a decided novelty.

The tug Fred E. Richards, built by the Neafie & Levy Ship and Engine Building Co., was successfully launched Tuesday. The new craft was built for the Rockland & Rockport Lime Co. of Maine, and is 135 ft., 26½ ft. beam and 15½ ft. depth of hold. Several steel barges are being built by the Harlan & Hollingsworth Ship Building Co. of Wilmington, Del., for the same company, and when completed they will be towed by the Richards and other tugs from where the lime is manufactured at Rockland to places where it is to be sold, thus displacing the present use of many sailing vessels.

When the New York Ship Building Co.'s plant is in full operation the yards on the Delaware river will regularly give employment to about 15,000 men. The yards themselves will represent an investment of upwards of $20,000,000, and they will be capable of turning out annually work to the value of $40,000,000, or the equal of the aggregate naval contracts let by the United States in 1900—the greatest year for new construction in its history.

Plans are now being prepared for the construction of a new steamer for the coast survey service to take the place of the Bache, now at Baltimore. The Bache has about outlived her usefulness. Specifications for bids will be given out about Sept. 1. Specifications will also be given out about the same time for a coast pilot steamer, both of which are to be completed by next spring.

The R. M. Spedden Co., Baltimore, Md., has just completed the new steel twin-screw tugboat Aguirre, which is intended for service on the coast of Cuba, in connection with the business of the Central Aguirre sugar plantation. The new tug is 73 ft. 10 in. long, 17 ft. beam and 6½ ft. depth of hold. She is equipped with Scotch boilers to stand a pressure of 110 lbs.

The new steamboat City of Rockland, building by William McKie, East Boston, for the Boston & Bangor route, will probably be launched the latter part of August. The hull is already planked, guards and guard frames in position and the engine frames set up. The W. & A. Fletcher Co. of Hoboken, N. J., are supplying her machinery.

Capt. John G. Crowley of Taunton, Mass., promises now to build a seven-masted schooner with a carrying capacity of 6,500 tons of coal. His six-masted schooner, building in the yard of H. M. Bean at Camden, Me., will be launched next month. She is 335 ft. long over all, 300 ft. keel, 46 ft. beam and 26 ft. depth of hold.

The Delaware river is forging to the front in shipbuilding. There is now under way at Philadelphia, Chester and adjacent points more than 100,000 tons of new mercantile shipping and naval ships, the aggregate displacement of which is upward of one-half of that figure.

The contract for repairing the extensive damage to the steamer Parthian has been awarded to the Atlantic Works, East Boston.

James & Tarr of Essex, Mass., are to build a schooner for Fred L. Davis and Capt. John Hendricksen.

Gardner C. Deering, Bath, Me., will build a 2,000-ton four-masted schooner.

Capt. James Hawley, Bath, Me., will build a four-masted schooner.

ALONG THE PACIFIC COAST.

The Western Steam Navigation Co.'s new steamship Mainlander was launched on Tuesday of this week from the yards of Crawford & Reid, Tacoma, Wash. The vessel is for the Vancouver line and is 162 ft. long, 28 ft. beam and 12 ft. 6 ins. deep. She is equipped with triple expansion engines 16, 27 and 44 inches, with 24-in. stroke, and has water tube boilers built by Charles L. Seabury & Co., New York. The vessel was designed by E. L. McAllister of Seattle, Wash., and was christened by Miss Lucy Cook.

Hay & Wright's ship yard at Alameda, Cal., is the scene of much activity. The new schooner Commerce, with a capacity of 900,000 ft. of lumber, will be launched next month. A duplicate of the Commerce has been laid down and a new steamer for the Inter-Island Steamship Co. of Hawaii will be begun at once. The new steamer is to be 172 ft. long, 36 ft. beam and 14 ft. deep. She will be much larger than the Kaiulani, which was built by Hay & Wright several years ago, and will exceed in speed any vessel in the inter-island trade.

EARLY SPRING NAVIGATION ON THE ST. LAWRENCE.

The people of Canada are advocating the opening of the St. Lawrence from Quebec to Montreal to navigation one month earlier than usual through the use of ice crushers. A writer in the Railway and Shipping World, speaking of it, says:

In the spring of 1898 the St. Lawrence was clear of ice in the first week of April—the Richelieu Co.'s steamer Berthier arrived at Three Rivers from Montreal on April 6. The spring opened early, and the warm sun had the effect of doing what a good ice breaker can do every spring at about the same date—or earlier—and not at a heavy outlay. The ice breakers built for Russia by Sir W. G. Armstrong, Whitworth & Co. of Newcastle-on-Tyne, are probably the best in the world—and have done remarkably good work in opening harbors—and in some cases keeping up regular communication through ice fields, in various parts of Russia, during the winter months.

It must be admitted that the time has come for the government of Canada to take prompt action in providing an ice breaker for the St. Lawrence. I would suggest the construction immediately of a vessel not quite as large as the Ermack, but of about the following dimensions: Length 250 ft., breadth 50 ft., draught of water 18 to 20 ft., fitted with three sets of triple-expansion engines—twin screws astern and one screw forward. Her duty would be to remain at Quebec during the winter and prevent the "key" being formed at Cap Rouge. Every time the ice bridge formed there she should cut it out, and thus prevent the formation of a mass of ice, which has already caused serious delay in the navigation of the St. Lawrence to Montreal. About April 1 every spring she should commence her annual cutting out of the ice all the way to Montreal, so that our first spring steamers may be scheduled to arrive in Montreal not later than April 10. If the "key" at Cap Rouge should form too thick for cutting through by our Jacques Cartier it should be blown up with dynamite whenever required during the winter. When the Jacques Cartier would have finished her work between Quebec and Montreal she would proceed to the Saguenay and open that river to navigation. Under present circumstances it is the second or third week in May before vessels can go up the Saguenay river. During the summer the Jacques Cartier should be stationed at Sydney—or some other most convenient port—and be ready to proceed at a moment's notice to the relief of any stranded vessel in the Straits of Belle Isle, on the coast of Anticosti, or elsewhere. I need only allude to the wreck of that fine steamer the Scotsman last season to prove the advantage of having our Jacques Cartier always on hand in case of emergency. How useful she would also be in assisting vessels late in the autumn, when a rather too early formation of ice on the St. Lawrence threatens to lock up some vessels all winter. On one occasion the Ermack rescued nine ice-bound steamers outside the port of Reval—and she has convoyed safely about 100 steamers into ice-bound ports. Our Jacques Cartier would seldom have to cut through ice more than 24 ins. thick on the St. Lawrence. I hope this important matter will be taken up seriously by the shipping and insurance interests, and especially by our representatives in parliament and the government of Canada. We cannot hope for uninterrupted winter navigation of the St. Lawrence, but we can save at least a month by having our Jacques Cartier built and at work as soon as possible."

TORPEDO BOAT BARNEY LAUNCHED.

The new United States torpedo boat Barney was launched successfully last Saturday at the Bath Iron Works, Bath, Me., and a large number of spectators witnessed the launching. The Barney was christened by Miss Ethel Nicholson Barney of Fredericksburg, Va., a great granddaughter of Commodore Joshua Barney of revolutionary fame, who also was the grandfather of the late Commodore J. H. Barney. Workmen for days have been busy lowering the Barney into the ways, from which she floated. Owing to their delicate construction torpedo boats are not launched from the shore in the ordinary way, but are lowered gently into the water at low tide in a cradle, from which they are released at high water. The Barney was authorized by the navy department in 1898. Her length between perpendiculars is 157 ft., her molded beam is 17 ft., depth at center amidships 10 ft. 9 ins. She is required to show a mean draft of 4 ft. 3 ins., a displacement of 150 tons and a speed of 28 knots on two hours' trial.

Sealed proposals will be received at the office of the Light-House Engineer, Tompkinsville, N. Y., until 12 o'clock M., August 7, 1900, and then opened, for the metal work and erection of Greens Ledge Light-House, Norwalk Harbor, Conn., in accordance with specifications, copies of which with blank proposals and other information, may be had upon application to D. P. Heap, Lieut. Colonel, Corps of Engineers, U. S. A.

Aug. 2

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Hillman, Gustav.....Brooklyn.
See, Horace.....New York.
Wood, W. J.....Chicago.

NICKEL STEEL FORGINGS.
Bethlehem Steel Co.....So. Bethlehem, Pa.

OAKUM.
Stratford Oakum Co., Geo.....Jersey City, N. J.

OILS AND LUBRICANTS.
Dixon Crucible Co., Jos.....Jersey City, N. J.
Standard Oil Co.....Cleveland.

PACKING.
Jenkins Bros.....New York.
Katzenstein, L. & Co.....New York.
Phenix Metallic Packing Co.....Chicago.
U. S. Metallic Packing Co.....Philadelphia.

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Smith, Edward & Co.....New York.
Upson-Walton Co.....Cleveland.

PAINTING MACHINES, PNEUMATIC.
Chicago Pneumatic Tool Co.....Chicago.

PATENT ATTORNEYS.
Thurston & Bates.....Cleveland.

PATTERN SHOP MACHINERY.
Fay & Egan Co., J. A.....Cincinnati, O.
Woods Machine Co., S. A..... .....So. Boston.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland.

PLANERS OF ALL KINDS.
American Tool Works Co. (The).....Cincinnati.
Niles Tool Works Co.....Hamilton, O.

PLANING MILL MACHINERY.
Fay & Egan Co., J. A.....Cincinnati, O.
Woods Machine Co., S. A.....So. Boston.

PLUMBING, MARINE.
Ellis Marine Plumbing Co.....New York.
Mott Iron Works, J. L.....New York.
Sands, Alfred B. & Son.....New York.
Kenney, The Co.....New York.

PNEUMATIC TOOLS.
Chicago Pneumatic Tool Co.....Chicago.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Standard Pneumatic Tool Co..... .....Chicago.

POLISH FOR METALS.
Bertram's Oil Polish Co.....Boston, Mass.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works Ltd.....Bath, Me.
Case, A. Wells & Son.....Highland Park, Conn.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fore River Engine Co.....Weymouth, Mass
Hardy, John B.....Tacoma, Wash.
Hyde Windlass Co.....Bath Me.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
MacKinnon Mfg Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Eng. Bldg Co...Philadelphia.
Newport News Ship Bldg. Co..Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.
Wolff & Zwicker Iron Works.....Portland, Ore.

PROJECTORS, ELECTRIC.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Sprague Electric Co.....New York.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F. Mnfg. Co.....New York.
Davidson, M. T.....Brooklyn, N. Y.
Kingsford Foundry & Machine Works..... .....Oswego, N. Y.
Van Duzen, The E. W. Co.....Cincinnati.
Worthington, Henry R.....New York.

PUNCHES, RIVETERS, SHEARS.
American Tool Works Co. (The).....Cincinnati.
Cleveland Punch & Shear Works Co.. ...Cleveland.
New Doty Mnfg. Co.....Janesville, Wis.
Niles Tool Works Co.....Hamilton, O.
Wood & Co., R. D.....Philadelphia.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register.....Cleveland.

RELEASING HOOKS FOR DETACHING BOATS.
Standard Aut. Releasing Hook Co.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland
Champion Rivet Co.....Cleveland.

RIGGING ROPE (WIRE).
American Steel & Wire Co.....Chicago.

RUBBER INSULATED WIRES.
Roebling's Sons, John A..New York and Cleveland.
American Steel & Wire Co.....Chicago.

SAFETY VALVES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

SAIL MAKERS.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby.....Boston.

SALVAGE COMPANIES.
See wrecking companies.

SCHOOLS, CORRESPONDENCE — ENGINEERING AND NAVIGATION.
International Correspondence Schools.....Scranton, Pa.

SCREW MACHINES.
American Tool Works Co. (The).....Cincinnati.
Niles Tool Works Co.....Hamilton, O.

SEARCH LIGHTS.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Sprague Electric Co.....New York.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

SEPARATORS, (CENTRIFUGAL).
Keystone Engine & Machine Works, W. L. Simpson, Engineer.....Philadelphia.

SHAPERS.
American Tool Works Co. (The).....Cincinnati.
Niles Tool Works Co.....Hamilton, O.

SHEARS.
See punches, riveters and shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Shipbuilding Co.....Detroit.
Fore River Engine Co.....Weymouth, Mass.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Iowa Iron Works.....Dubuque, Ia.
Jenks Ship Building Co.....Port Huron, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Eng. Bldg. Co..Philadelphia.
Newport News Ship Bldg. Co...Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Townsend & Downey Ship Bldg. Co.....New York.
Trigg, Wm. R. Co.....Richmond, Va.
Union Dry Dock Co.....Buffalo.
Union Iron Works.....San Francisco.
Willard, Chas. P. & Co..... .....Chicago.
Wolff & Zwicker Iron Works.....Portland, Ore.

SHIP CHANDLERS.
Baker, Howard H. & Co.....Buffalo.
Marine Supply Co..... .....Fairport Harbor, O.
Moran, Bros. Co.....Seattle, Wash.
Upson-Walton Co.....Cleveland.

SPARS—LARGE SIZES.
Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSEL FOR SALE.
Holmes, Samuel.....New York.

STEEL OR IRON STAYBOLTS, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.....New York.
Erie & Western Trans. Co.....Buffalo.
International Nav. Co.....Philadelphia.
Red Star Line.....New York.

STEEL SHAFTS, SOLID OR HOLLOW.

Bethlehem Steel Co.....So. Bethlehem, Pa.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Detroit Shipbuilding Co.....Detroit.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
Sheriffs Mfg. Co.....Milwaukee

STOCKS, BONDS, SECURITIES.

Wright, Herbert & Co.....Cleveland.

STOCKLESS ANCHORS.

Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

STRUCTURES OF STEEL, BUILDERS OF.

American Bridge Co.....New York.

SURVEYORS, MARINE.

Curr, Robert.....Cleveland.
Gibbs & Joys.....Milwaukee.

TELEGRAPH—DECK AND ENGINE ROOM.

Cory, Chas. & Son.....New York.

TESTS OF MATERIAL.

Hunt, Robert W. & Co.....Chicago.
Pittsburgh Testing Laboratory, Ltd.....Pittsburgh.

THERMOMETERS FOR MECHANICAL PURPOSES.

Helios-Upton Co.....Peabody, Mass.

TIMBER—LARGE PIECES.

Moran Bros. Co.....Seattle, Wash.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

American Tool Works Co. (The).....Cincinnati.
Chicago Pneumatic Tool Co.....Chicago.
Cleveland Punch & Shear Works Co.....Cleveland.
New Doty Mnfg. Co.....Janesville, Wis.
Niles Tool Works Co.....Hamilton, O.
Pelton Engineering Co.....Cleveland.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Standard Pneumatic Tool Co.....Chicago.
Wood & Co., R. D.....Philadelphia.

TOOLS, WOOD WORKING.

Fay & Egan Co., J. A.....Cincinnati, O.
Woods Machine Co., S. A.....So. Boston.

TRUCKS.

Boston & Lockport Block Co.....Boston, Mass.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.
Playfair's Barge & Tug Line.....Midland, Ont.

TOWING COMPANIES.

Calvin Co., The.....Kingston, Ont.
Donnelly Salvage & Wrecking Co...Kingston, Ont.
Swain Wrecking Co.....Detroit.

TUBING FOR BOILERS.

Atlantic Tube Co.....Pittsburg.
Shelby Steel Tube Co.....Cleveland.

TUBES, SEAMLESS DRAWN, BRASS AND COPPER.

Hungerford Brass & Copper Co., U. T.....New York.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Jenkins Bros.....New York.

VARNISH MAKERS, COLOR GRINDERS, ETC.

Smith, Edward & Co.....New York.

VARNISH PAINT.

Mair, John & Son.....Philadelphia.

VESSEL AND FREIGHT AGENTS.

Boland, John J.....Buffalo.
Brown & Co.....Buffalo.
Bull & Co, A. H.....New York.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Gibbs & Joys.....Milwaukee.
Hall & Root.....Buffalo.
Hawgood & Moore.....Cleveland.
Helm, D. T. & Co.....Duluth, Minn.
Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
Mitchell & Co.....Cleveland.
Moffat & O'Brien.....San Francisco.
Pauly, H. J.....Milwaukee.
Richardson, W. C.....Cleveland.

VENTILATING APPARATUS FOR SHIPS.

Buffalo Forge Co.....Buffalo.
Sprague Electric Co.....New York.
Sturtevant Co., B. F.....Boston.

WIRE ROPE AND WIRE ROPE FITTINGS.

American Steel & Wire Co.....Chicago.
Baker, H. H. & Co.....Buffalo.
Roebling's Sons, John A..New York and Cleveland.
Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Signal & Control Co.....New York.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.

Fay & Egan Co., J. A.....Cincinnati, O.
Woods Machine Co., S. A.....So. Boston.

WORM GEARING.

Morse, Williams & Co.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Calvin Co., The.....Kingston, Ont.
Donnelly Salvage & Wrecking Co...Kingston, Ont.
Playfair's Barge & Tug Line.....Midland, Ont.
Swain Wrecking Co.....Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.

Wilson & Silsby.....Boston.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Electric Boat Co.....New York.
Gas Engine & Power Co.....New York.
Lane & DeGroot.....Brooklyn.
Willard, Chas. P. & Co.....Chicago.

YAWLS.

Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Brooklyn.

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The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

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CLEVELAND CITY TICKET OFFICE,
237 SUPERIOR STREET.

Eastward:—	Ar. fr. West.	Dep. East.
No. 18, Southwestern Limited	.....	*1 55 am
No. 22, Lake Shore Limited	*2 15 am	*2 20 am
No. 28, New York & Boston Express	*7 40 am	*8 00 am
No. 32, Fast Mail	*11 25 am	*11 30 am
No. 44, Accommodation, via Sandusky	†1 15 pm	.....
No. 46, Southwestern Express	.....	*3 00 pm
No. 6, Limited Fast Mail	*5 40 pm	*5 45 pm
No. 10, Chicago, New York & Boston Special	*7 35 pm	*7 40 pm
No. 16, New England Express	*10 30 pm	*10 35 pm
No. 2, Day Express	†9 05 pm	†9 20 pm
No. 126, Norwalk Accommodation	†7 55 am	.....
No. 40, Toledo & Buffalo Accom., via Norwalk.	†10 00 am	†10 30 am
No. 126, Norwalk Accommodation	†7 55 am	.....
No. 116, Conneaut Accommodation	.....	†4 30 pm

Westward:—	Ar. fr. East.	Dep. West.
No. 11, Southwestern Limited	*3 25 am	.....
No. 15, New York, Boston & Chicago Special	*3 05 am	*3 10 am
No. 21, New York & Chicago Express	*5 10 am	*5 20 am
No. 7, Day Express	.....	†6 30 am
No. 19, The Lake Shore Limited	*7 35 am	*7 40 am
No. 23, Western Express	*11 10 am	*11 15 am
No. 33, Southwestern Express	*12 25 pm	.....
No. 133, United States Express	.....	*12 40 pm
No. 47, Accommodation	.....	†3 00 pm
No. 141, Sandusky Accommodation	.....	†3 10 pm
No. 127, Norwalk Accommodation	.....	†5 10 pm
No. 37, Pacific Express	*6 35 pm	*7 00 pm
No. 3, Fast Mail Limited	*10 50 pm	*10 55 pm

*Daily. †Daily except Sunday.
Trains Nos. 28 and 37 run via Erie station.

WANTED, FOR SALE, FOR CHARTER, Etc.

Space under this heading 25 cents a line, each insertion, for three insertions or less. Special rates for periods of more than three insertions.

—FOR SALE—Barge Manitowoc, 210 by 29 by 13 feet. Capacity 650 M lumber or 1,000 tons coal. John J. Boland, 202 Main street, Buffalo, N. Y. d

—FOR SALE—Good tug, six years old. Engines 18x20. Boiler allowed 130 pounds steam pressure. Address Box 284, Ashland, Wis. Aug. 16

—FOR SALE—Side-wheel steamer John F. Lincoln, with all equipment, including electric light plant. May be inspected at Cape Girardeau, Mo. For sale, also, very cheap, horizontal boiler 24 feet by 47 inches, with ten 6-inch tubes, and allowed 160 pounds of steam; $150 will buy a complete set of tug machinery—engine 12 1-16x18, with 4-inch shaft, stuffing box, journal bearings, and a 4½-foot wheel. Address Linehan Railway Transfer Co., Dubuque, Ia. d

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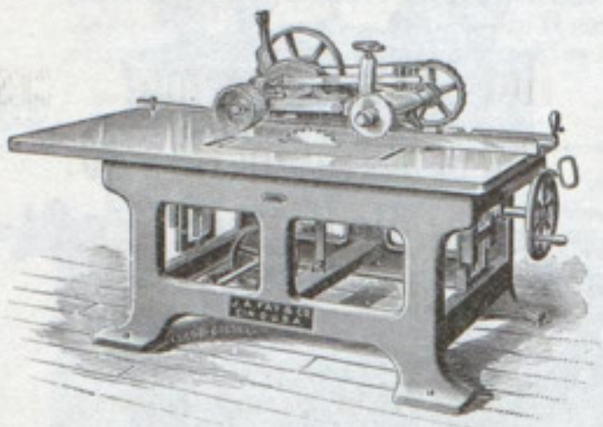
—FOR SALE—Marine boiler of 6½ by 12 feet. Allowed 110 pounds steam. Never been cut. Also breeching smokestack and grates. E. E. Koch, Sandusky, O. Sept. 21.

—FOR SALE—Scotch marine water-back boiler; 7 feet diameter, 11 feet long; dome 30x30 inches; furnace 40 inches diameter; 69 3-inch tubes, 8 feet 6 inches long. Built under government inspection and just completed. Price $2,000. F. O. B. cars Minneapolis. Address Nicollect Island Boiler Works, Minneapolis, Minn. tf

MARINE REVIEW

VOL. XXII. CLEVELAND, O., AUGUST 2, 1900. No. 5

Wood-Working Machinery of Every Description.



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VARIABLE FEED. POWERFUL FEED AND DELIVERY ROLL. PARALLEL RAISING TABLE. INDEX GAUGE.

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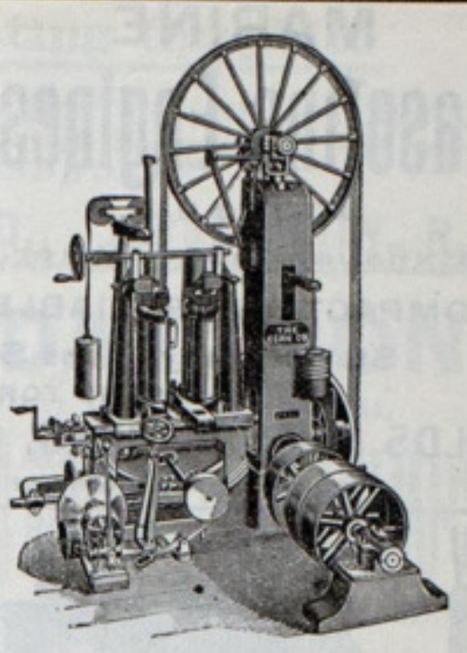

EGAN No. 9 BAND RE-SAW. WITH VARIABLE FEED.

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Buffalo Creek and Ganson St., BUFFALO, N. Y.

BUFFALO, WILKES-BARRE, BUILDERS OF **IRON AND STEEL STEAMSHIPS.** STARUCCA, CODORUS.

Best Place in Buffalo for Prompt and Economical Repairs. Two Dry Docks and Most Modern Machinery Electrically Driven.

ELECTRIC LIGHTING PLANT SO THAT WORK MAY BE CARRIED ON BY NIGHT AS WELL AS BY DAY.

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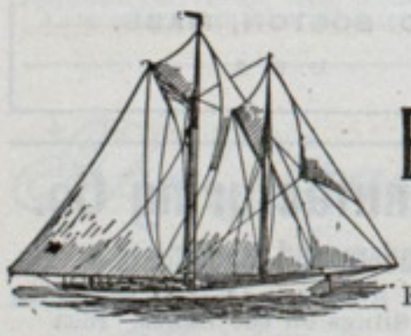
30 Montgomery St., San Francisco.

PIERS: 14 & 15 NORTH RIVER, FOOT OF FULTON ST., NEW YORK.



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Pure White, Jet Black and Wood Colors.

For filling deck and all other seams above or below water; cracks and checks in rails, bowsprits, masts, etc.

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(Signed) Winfield Davidson.

Rockville Centre, L. I., Nov. 29, 1899.

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